FOOD MANUFACTURE

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World Food Survey

THE report on world food prospects, issued from the U.S. Department of Agriculture early in August, agrees substantially, as might be expected, with the report published by the Food and Agriculture Organisation in preparation for its September conference in Copenhagen. Wheat stocks are inconveniently low, and the world will have to depend upon current production. The European total food production will probably be 8 to 10 per cent. above the 1945 level, but it will still be 10 to 12 per cent. or more below the pre-war averages. This implies that the Continent, which before the war could get on with a gross import of about 3 million tons of wheat, will have to import in 1946-1947 anything from 12 to 15 million tons. Necessarily the conditions will vary from country to country, since the available food cannot be evened out over the whole area. But there are prospects that the Danubian countries will be self-supporting among themselves, possibly with the assistance of shipments from Russia. Germany, Austria, Italy, and some of the western countries will, however, still remain a liability.

The anticipated harvest in North America should be a good one, though not a record one. Wheat acreage in Canada has increased nearly 10 per cent. over a year ago, though the production of meat, eggs, and dairy products is expected to be relatively low. In South America excessive rainfalls have hindered somewhat the planting of winter grain; but food exports are expected to rise considerably. It is doubtful, on the other hand, whether North Africa will yield anything approaching its pre-war average export surplus of grain, though it may reach the margin of self-sufficiency. Australia has increased her winter wheat acreage by 17 per cent., and the general prospect there and in New Zealand is of reasonable levels of food production, particularly since the drought appears to have broken in the latter country.

The Russian position is still uncertain. Reports show that the harvest is well advanced, and some economists believe there may be a 2 million ton grain surplus for export. The level of Russian grain exports in the past year to France, Finland, and South-Eastern Europe probably reached 1 to 1½ million tons. Meanwhile, the position in the Far East will remain very serious. In 1946-1947 there will have to be a grain import to the area of anything from 12 to 14 million tons, if so much is available. It is said that in India political disturbances, the uncertainty of rice prices, and unfavourable weather have all contributed to retard the expansion of food production. The next three or four months will obviously be critical; and it is not improbable that the news in the late autumn will reveal conditions of extreme famine in several regions. The Middle East, on the other hand, continues to be generally secure, provided that the political situation permits the movement of food from the surplus to the deficit areas; there may be a small export surplus for the European market, but rather in fruits than in grain.

Taking a broad view of the position, we may say that the harvest of the Northern Hemisphere will bring temporary relief; but the total estimated grain requirements of the deficit countries in 1946-1947 will still be far above the total exportable stocks in the surplus countries. In other words, stocks will have to be conserved. Unless UNRRA is replaced by some other organisation, the responsibility for relief shipments will fall upon the individual countries. If, as is likely, Britain makes arrangements to purchase not merely the Canadian but also the Australian surplus wheat, she will be placed in control of a margin of wheat over and above her own requirements. This might amount to 2 million tons; and unless the new Emergency Food Council replaces UNRRA and the Combined Food Board, Britain will be able to dispose of this 2 million ton surplus that she has thoughtfully acquired. It sets her in a stronger position for dealing with the serious Indian deficiency and perhaps, in addition, to guarantee the import levels of a few of the western countries of Europe and of her zone of Germany.

Quick Frozen Fruit

A series of experiments on the quick freezing of a fair bulk of fruit crop has been initiated by the North British Cold Storage and Ice Co., Ltd., to ascertain the degree of success possible in the quick freezing and cold storage of Scottish-grown types. Earlier experiments with smaller volumes have demonstrated highly successful results, but it is obvious that experience must be gained with larger bulks to ensure the commercial success of the plant and the system as applied to the produce grown in the country. Experience has shown that, in the U.S.A., crops of the same type grown in different areas responded in varying degrees to processing. Whether the same variations are likely in a smaller country such as Britain remains to be demonstrated, but the possibility is not being overlooked.

The management of the company has recently contacted growers in the Lanarkshire and Blairgowrie areas, where arrangements have been made for the delivery of agreed volumes of fruit for testing purposes. These include strawberries, rhubarb, tomatoes, and gooseberries, all of which are now in process of freezing and storage. The company indicates again that it has no desire to enter the trading field, but is interested in this further experiment to demonstrate to growers the possibilities of quick freezing in their own work. Growers are being invited to deliver prepared fruits or produce to the plant for freezing and subsequent release. It is pointed out that jam makers, for instance, need no longer concentrate their production into a period of intense and costly activity controlled by the availability of fruit, but that the production of jam, as of many other food products, can now be carried on all the year round by the controlled release of their raw materials from cold storage. This is the type of business which it is hoped increasingly to encourage.

Sour Bread is not Poisonous

During the past few weeks we have received both written and verbal enquiries about the quality of bread as at present distributed and its possible connexion with sundry small outbreaks of food infection in different parts of the country. Such apprehensions are unfounded.

The moisture content of flour is such that no bacterial decomposition can take place; indeed, during storage the bacterial population decreases very considerably. The oxidative and enzymic changes which may occur during prolonged storage lead to a deterioration of baking quality and of palatability, but do not give rise to any substance of a toxic or harmful nature. In the case of bread, adverse and prolonged storage might lead to the development of "rope" or mould, rendering the bread unfit for consumption, but such bread would be visibly unfit to eat. It may here be emphasised that the rope bacteria are non-pathogenic and, although "ropey" bread would not be eaten because of its unpleasant odour, its consumption would have no harmful effect. Also, the consumption of bread which smells sour, whether this be due to over-fermentation of the dough or to prolonged storage of the flour, would have no ill effects, although the bread might be unpalatable.

As the rate of extraction is raised, the resulting flour contains increasing amounts of germ and particles of the skin coatings of the grain. In consequence the fat content of the flour is increased and it becomes more enzymatically active. A high-extraction flour is therefore more liable than the pre-war white flour to develop both rancidity and acidity under unfavourable storage conditions. It is compulsory upon the miller at the present time to include all the germ in his flour, and this fact, in conjunction with the high bran content entailed by milling to 90 per cent. extraction, significantly impairs its keeping qualities. These depend upon storage conditions, but it would be unwise to store present-day flour for more than two or three months if rancidity is to be avoided.

Fluorine and Fluorosis

Although not within the terms of reference of the report of the Inter-Departmental Committee on Food Standards on "Fluorine in Calcium Acid Phosphate" (an abstract of which is published elsewhere in this issue), they have brought to the Ministry of Food's attention the need for further research into the effects of long-continued ingestion of small quantities of fluorine in food. In the areas of India and elsewhere where fluorine is endemic, ample material is ready to hand for the investigation of this matter which may well have a considerably greater bearing on the public health than has hitherto been generally realised.

The Committee suggest that the Ministry should draw the attention of the Medical Research Council, or other organisation able to arrange for the conduct of research work of this kind, to the desirability in the public interests of a thorough investigation of the effects of fluorine ingestion being undertaken at an early date.

Expert opinion as to the effects of fluorine is

evidently somewhat conflicting, and it would be interesting to know how the proposed limits for fluorine in calcium acid phosphate have been fixed and whether the human requirements of fluorine have been accurately ascertained. If limiting fluorine in essential baking products is regarded as necessary, it might be enquired whether the sources of fluorine in human food might not be extended beyond the region of cakes and pastries.

Square Milk Bottles

The square milk bottle has made its *début* in England. It has been introduced by a Liverpool firm who, after a three months' trial, are well pleased with having made the change.

The decision to adopt the square bottle followed a visit to America last autumn by the general manager of the firm. He was so impressed by what he experienced in America that he persuaded the directors to adopt that type of bottle. The enthusiasm with which their customers have received the square bottle outweighs all the arguments against it.

The square milk bottle is unlikely to make rapid progress in Britain just yet. The Board of Trade have asked the Glass Manufacturers' Federation not to encourage its production at the present time. The official view is that because of the shortage of bottles of all descriptions and the importance, in the national interest, of maintaining maximum output the time is inopportune for using manpower in the production of new moulds and for adapting machinery to produce a new type of bottle. The Government view is that the change would not increase the rate of production.

When the Council of the National Dairymen's Association recently investigated the merits and demerits of the square milk bottle, the general opinion was that it would give distinct advantages in milk storage and distribution, though the benefits would be less marked than in America.

The new bottle is expected to make further headway when conditions become more normal.

Refrigeration Equipment Prospects

Criticism of the anxiety of newcomers to the refrigeration industry to cash in on the admitted demand for equipment has been current in the established trade, which foresees that "some of the present entrants will get their fingers burned."

It is difficult to assess how much of this criticism is actuated by fear of increased competition and how much of it is genuinely concerned at the danger that sub-standard goods will be marketed. One Glasgow refrigeration engineering firm with some twenty-five years of experience in the field stressed that many of the newcomers to both the retailing and manufacturing branches have no sound knowledge of the subject or the experience to back that knowledge. It must be added that there is also a body of competent, efficient, and honest entrants who look to refrigeration as a coming field of enterprise. The chief complaint is levelled against men with some engineering experience who buy secondhand equipment, scrap the useless material, and buy parts to rebuild equipment which is then sold as a new or nearly new unit. Skilled firms indicate that these men display their ignorance in ordering motors which are not suited to the equipment they are handling and in similar ways.

A quick survey of demand shows an immense household market which has been merely touched as yet. When conditions permit the supply and installation of household refrigerators will be a major business. Ice cream trade demands are immense, and milk producers are also extremely active. More dairy refrigeration units have been bought in the past two months than in the last two years. The farmer has realised that he must produce cleaner milk, unless he wishes to see his output drafted to the centralised heat treatment pool. He is installing either direct expansion or brine plants on the farms, thereby ensuring that he has no losses, top price, and freedom of action. There is every reason to believe that this policy will be increasingly followed. There is some movement in the meat trade, but relatively little in comparison to that in other fields.

Oil from Herring

The release of the news that negotiations are proceeding in private with regard to the development of herring oil processing and production, adds point to earlier information available from the Herring Industry Board that this would form an important part of their policy in the future. Up till now the Board has been reluctant to release information as to its intentions in this sphere beyond confirming that it is intended to process herring for meal and oil. Meal, obviously, will find a market in the agricultural field and possibly in human food preparation, although the strong distinctive flavour of the herring may be a retarding feature for use in the latter sphere just as it has retarded the development of cod-liver oil consumption. On the other hand, there is adequate justification for assuming that methods will be commercially available, in due course, for the ex-

traction of the virtues of the flesh without undue flavouring. Although no indication has been given as to probable markets, industrially it is believed that herring oil will find a good market in machine tool operation, in the motor trade, in the high-speed cutting industries, and in almost every sphere where oils and fats are used. The present conversations centre, it is indicated, around the use of herring oil for supplementing the fat and butter ration, and it may well be that this eventually will be a major outlet for the industry.

It is not yet positive what plants are in operation for this purpose, but it was the intention to establish one in the Shetlands. Discussions are now revolving around the price which fishermen may be given for such fish. This may prove a difficult point, since the processors will naturally wish to obtain guaranteed supplies at prices lower than market prices where herring is intended for human consumption. This battle has already been successfully solved in the case of herring for canning, the canners and the fishing interests having agreed to a compromise on the price originally demanded by the fishermen for higher levels.

The Herring Industry Board stresses that it is preferable for the herring industry to produce a maximum volume of catch and to sell every possible cran at the highest price available for whatever purpose may lie to hand, thus maintaining a maximum inflow of money into the industry as an alternative to the earlier policy of limiting catches to a certain level in order to force the highest possible price for each catch. The present negotiations for an outlet for herring oil and meal will therefore assist in this policy of bringing in valuable cash, even if at a lower level per cran than for human consumption.

No details are as yet available as to the scope, progress, or financial basis of the negotiations, the outcome of which will be awaited with great interest.

Ice Cream Manufacturers' Pitfalls

Misunderstandings about the use of saccharin and household milk powder are adding to the difficulties that confront ice cream manufacturers. Several firms have recently been fined—in one instance £150—for using these products illegally.

The use of saccharin is prohibited by any ice cream manufacturer unless he holds a catering licence issued by the Ministry of Food, and in such cases saccharin can only be used in ice cream that is sold in accordance with the terms of the catering licence. If the licence only permits the sale of meals for consumption on the premises, then ice cream containing saccharin must not be sold for consumption off the premises.

Trouble over household milk powder appears to have arisen out of the fact that the Use of Milk (Restriction) Order, 1945, specifically excludes caterers from the scope of the Order. This has given rise to the erroneous impression that a caterer can legally use any processed milk. The correct position is that he can only use milk and processed milk that he can legally buy.

Every caterer seems to be alive to the fact that the quantity of liquid milk he can legally buy is limited; but few seem to be aware that they cannot legally buy household milk powder. Retailers are allowed to dispose of their stocks of this powder among their registered domestic customers without restriction as to quantity; but they are not allowed to sell to other categories and customers. Hence an ice cream manufacturer cannot legally buy household milk powder and consequently cannot use it in his mix.

Calcifortication

We hesitate to coin words, but feel that only an artificial language can express the present attitude to foodstuffs in general and cereals in particular. When our rulers, in their infinite wisdom, agreed with certain nutritionists to increase the extraction of flour, they discovered snags of the worst order. Research workers of undoubted reputation soon demonstrated the disturbance of the calcium-phosphorus ratio by the "unallowed for" presence of phytic acid in the bran. This, of course, set the chalk among the chickens, and after much consideration it was decided to add *creta praeparata* to flour at the rate of 7 oz. per 280 lb. flour. This was a compromise—as the original proposers of the addition pressed for considerably more. Now, the opportunity of the calcified minds has come again. The extraction of flour has been increased from 85 per cent. to 90 per cent., which means a further addition of roughly 6 per cent. of branny matter based on the 85 per cent. extraction. This has been compensated for by 100 per cent. extra calcium—7 oz. to 14 oz. We have not yet discovered any authentic evidence that this intake of chalk can be assimilated by the human metabolism sufficiently and rapidly enough to counteract the effect of phytic acid, and one cannot help thinking that our nutritional advisers are persistently taking shots in the dark. We wonder what target they will ultimately hit, and possibly destroy!

Factory ships at Deception Island.

Whalemeat

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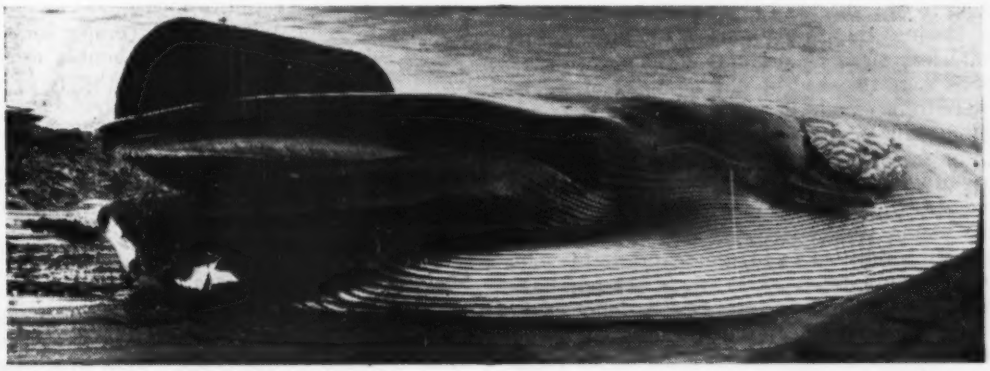
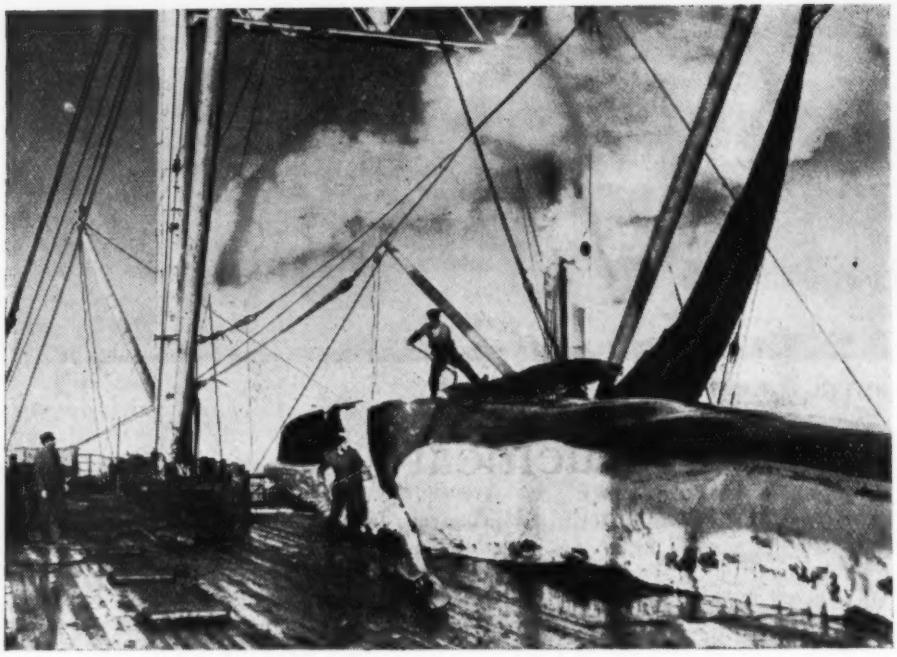
The whole subject of the utilisation of whalemeat for human food has, up to the present, been only superficially surveyed, but nowhere have the results suggested that any fundamental obstacle exists in the future development with the practical objective of utilising whale protein as a valuable foodstuff in one form or another. The large modern factory vessels provide ample opportunity for the investigation of a whole range of problems of biological and biochemical interest, and for studying such practical questions as the grading and selection of the meat and the effect of various treatments upon it.

IN spite of the name usually given to the industry devoted to the catching of whales, the whale is not a fish, and its flesh is totally unlike that of fishes. Like any other mammal, the whale has flesh which is red in colour, and which in composition, taste, and texture (except as will be described later) closely resembles beef. It is eaten and enjoyed by the crews of the whaling vessels, and by the inhabitants of those stretches of the North Atlantic coastline from which off-shore whaling is carried out.

The economic value of the whale lies almost



Left side of head and shoulder.



Flensing a Blue whale of its blubber.

wholly in its oil, and before the war only a small part of the flesh was brought back to Europe from the Antarctic grounds in the form of dried meat meal for animal feeding. This meat meal was recognised to have a very high nutritive value, as well it should, since it consists of protein of the very highest biological value. The greater part of the meat, after cooking to recover the oil, was thrown back into the sea. In the last season before the war it was calculated that the whalemeat caught by twenty British and Norwegian expeditions amounted to over half a million tons. Allowing for the fact that this meat is boneless, the catch represents an amount of meat equal to more than half the total annual British import of meat.

The Antarctic Whale Population

Owing to unrestricted catching, the whale population during the first quarter of the century showed clear signs of decline, and increasing restrictions were imposed on the numbers of whales that were to be caught in any season. In 1931 and the succeeding years closer and closer restrictions were imposed by international agreement for the capture of whales. The season for catching was restricted to the period between December and March; young whales and females accompanying them were protected, and the capture of some species was prohibited for a whole season. The effect of these restrictions was closely followed by the Discovery Committee, and it will be interesting to learn to what extent rehabilitation of the population has been accomplished by the seven years' holiday that the whales have enjoyed since the outbreak of war put a virtual stop to whaling.

Four species of whale are normally caught in the Antarctic seas. Two of these, the Blue and the Fin whales, on account both of their great size and of the larger numbers caught, provide the bulk of the oil produced. The other species are the Sei and Humpback whale. The size of these animals is almost unimaginable. The largest whale recorded,[1] a Blue whale, measured 97 feet and was estimated to weigh 163·7 tons. A Fin whale of 68 feet weighing 57·9 tons and a Humpback whale of 45½ feet weighing 31·9 tons have been recorded.[2] Considering that about 50 per cent. of the animal consists of lean meat, one is impressed both with the amount of potential human food that a single whale might provide, and with the engineering problem that its capture and utilisation presents. A large ox, for purposes of comparison, yields 600 lb. of boneless meat, just about a three-hundredth part of the yield from the record Blue whale.

For purposes of legal control of the capture of whales, the catch is converted into "Blue whale units," one Blue whale being equivalent to two Fin, two and a half Humpback, and six Sei whales.

Anatomical Considerations

Since, by comparison with land mammals, the limbs are greatly reduced, most of the meat on a whale is found on the trunk. Half of it, the most readily accessible, is in fact found in two muscles,

Flensing a Fin whale at Grytviken, South Georgia.

the *longissimi dorsi*, that run from head to tail along the back. Together with the *psoas* muscles, which run along the inner surface of the ribs alongside the vertebral column, they are known as the back fillets and constitute 70 per cent. of the flesh. These muscles are straight-grained, and form more suitable meat than the remaining muscles of the ribs and shoulders, which are scrappy and confused owing to the complexity of the musculature in this region.

Contrary to expectation, the muscles do not as a rule contain so much fat as do those of our ordinary meat animals. The adipose tissue of the whale, from which the oil is largely obtained, occurs as a layer of blubber around the body, quite distinct from the meat. This layer varies in thickness with the fatness of the animal, but may reach 8 in. in thickness and represent 20 per cent. of the body weight. The figures given in Table 1 show that the complaint of the consumer is likely to be that there is too little rather than too much fat on a whalemeat steak. Apart from the proportion of adipose tissue that is usually served with a grilled beefsteak, the so-called "lean" of butcher's meat may contain as much as 12 per cent. of fat, whereas the corresponding value for whalemeat does not appear to exceed 5 per cent.

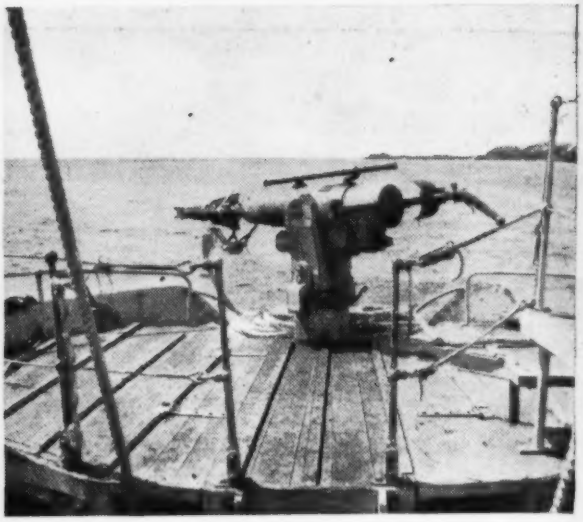
Palatability of Fresh Whalemeat[3]

The whalers usually hang their meat in the cold Antarctic air for at least a week and sometimes for as long as a fortnight before cooking it. After hanging for a day or two the flesh hardens and blackens on the outside, the inside becoming soft and tender. Before preparation the hard black crust is cut away, the tender inside only being used. A quantity of blood drains away while the

TABLE 1.

Serial No.	*Species.*	*Class.*	*H_2O. (Per Cent.)*	*Fat. (Per Cent.)*	*Protein. (Coag. N × 5·9.) (Per Cent.)*	*Non-Coagulable N as Per Cent. of Total N.*	*Creatine + Creatinine. (Per Cent.)*	*Urea. (Per Cent.)*	*Acid-Soluble Phosphorus. (Per Cent.)*	*Iodine Value of Fat.*
522	Fin	A	74·2	0·7	18·2	19·1	0·457	0·130	0·183	73·2
513	,,	A	73·9	0·8	17·6	18·4	—	—	—	—
551	,,	A	75·3	1·4	16·8	19·1	0·456	0·114	0·178	66·8
570	,,	B	75·1	1·4	16·2	23·7	0·460	0·107	—	67·7
564	,,	A	73·3	1·5	17·9	20·5	0·485	0·122	0·190	63·6
572	,,	A	76·5	2·2	15·7	19·1	0·425	0·115	0·157	66·8
552	Blue	C	71·8	2·8	17·8	19·2	0·491	0·108	0·172	64·3
532	,,	A	72·7	3·3	16·7	19·3	—	—	—	—
538	,,	A	73·9	3·7	16·2	18·6	0·457	0·089	0·161	72·8
509	,,	C	72·5	3·9	15·3	22·0	—	—	—	—
563A	Fin	C	71·1	5·0	17·5	18·3	—	—	—	—
563B	,,	C	71·2	5·1	16·6	20·0	0·479	0·108	0·163	75·5
508	Blue	B	71·7	6·3	15·1	20·8	0·485	0·091	—	78·2

Flagged whale about to be pulled up the slipway after harpooning.



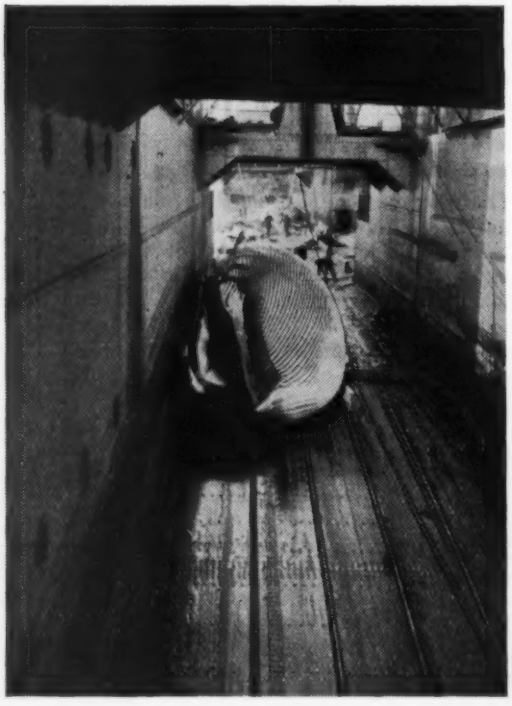
Harpoon gun on board the whaler.

Whale Factory Ship in Action

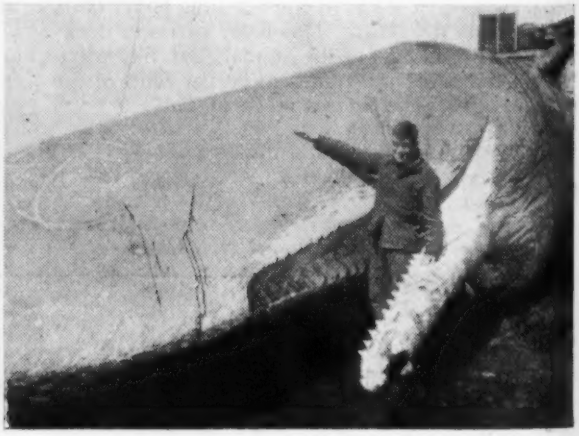
The launching of the whale factory ship "Southern Venturer" was described in FOOD MANUFACTURE, December, 1945. This series of photographs taken by Mr. R. J. Hewer, engineering foreman on board, depicts the work in full swing during last season's whaling expedition to South Georgia.

The "Southern Venturer" has now returned from its first voyage and is lying at South Shields for refitting.

Courtesy Rose, Downs and Thompson, Ltd.

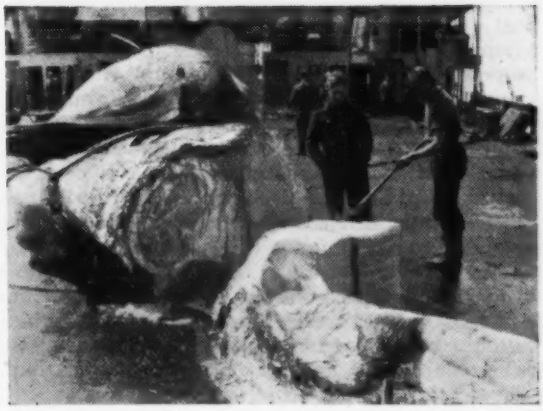


Blue whale being pulled up the slipway and on to the deck.



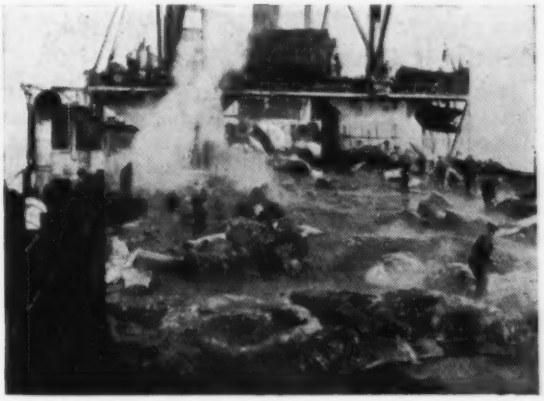
Deck boy standing in the jaws of a Sperm whale, showing comparison in size.

Interested members of the crew watching the first whale being pulled on to the flensing deck.

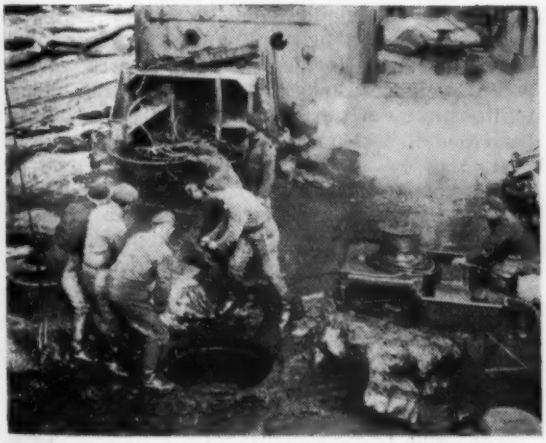


Head of a Sperm whale partly cut open showing spermaceti, used in the manufacture of candles.

Conveyor feeding the Kvaerner hogger, which minces the whalemeat into a slurry before drying.



Meat being placed on the conveyor to the cutting machine feeding the driers.



Feeding meat and bones to the pressure boilers for the extraction of oil.

The removal of skin and blubber taking place on the flensing deck.

meat is hanging, and it is probable that the loss of it improves the quality or sweetness of the meat.

One of the best ways of serving hung whalemeat is as a fried steak with onions. In this form, both in colour and flavour, whalemeat is not readily distinguishable from best beefsteak. It is remarkably tender, in this respect being equal to good fillet steak. In addition to its being an excellent subject for straight frying, whalemeat is commonly used on the whaling grounds as a basis for the preparation of sausages, meat balls, and other made-up meat dishes. These take the place of beef or pork sausages and similar products which as a rule can only be obtained at sea in tins. The whalers also produce a *biltong* from whalemeat which has been salted and smoked. This is eaten raw, the blackened crust being cut away and the inside cut into very thin slivers and served as an *hors d'oeuvre* or savoury. It has an attractive smoky flavour inclined to a certain pungency associated with all cured flesh.

Variation in Quality

It is recognised by the whalers that whalemeat varies greatly in quality. It certainly varies greatly in appearance from one carcass to another, depending for the most part on the size and therefore on the age of the individual. In immature animals the flesh is pale, darkening with increasing age, that of the oldest animals being of a deep black-red. In such meat can be seen narrow white tendons crossing at varying angles and giving to the dark meat the appearance of quartz veins in rock. This connective tissue represents, of course, the necessary mechanical support for the huge mass of contractile tissue, and its means of attachment to the ribs and vertebrae. Meat is selected for eating purposes on the basis of depth of colour, the paler meat being both more tender and of a better flavour. As the meat becomes darker, and possibly as the animal reaches sexual maturity, a stronger characteristic flavour enters into it, which can only be described as "whaley." There is no evidence of difference between the two principal species, Blue and Fin.

A proportion of the catch is therefore good meat and a proportion not so good. If whalemeat is to be used for food it is obviously very desirable to know how much of each quality can be expected, and how to select the meat as it is caught so that it can be allocated to its most appropriate use. The criteria employed must be ascertainable by the simplest tests, and preferably such as are normally logged by the Ministry of Agriculture and Fisheries' inspectors who accompany each expedition. These are, for instance, species and size, estimated age and weight. Actually a rough system of grading of the meat has been practised by the officers of one whaling company. In this system the whalers relied very largely upon the colour of the flesh, classifying the meat into three classes: A, pale red flesh; B, darker red; and C, very dark red, almost black.

Any criteria employed for grading and selecting meat must be backed by palatability tests. At the present time there is no substitute for such tests in the form of analytical coefficients; such substitution must depend on simultaneous tests of palatability and chemical composition carried out on a large number of samples. A few such tests have already been made with samples brought back from the Antarctic in 1940, and have been compared with the whalers' classification into A, B, and C grades.

TABLE 2.

	Whalemeat. (Per Cent.)	*Typical Mammalian Muscle. (Per Cent.)*
Water	71·1-76·5	75
Protein	15·1-17·9	18·5
Fat	0·7-6·3	3
Carnosine	0·42-0·67	0·5
"Anserine"	0·99-1·30	
Creatine	0·43-0·49	0·4
Purines (as hypoxanthine)	0·12-0·13	0·12
Urea	0·09-0·13	0·06
Acid soluble P	0·16-0·19	0·15
Na	0·07	0·05
K	0·295	0·42
Ca	0·004	0·01
Mg	0·022	0·03
Cl	0·026-0·128	0·06
Lactate	1·1-1·3	0·9

Composition of Samples of Whalemeat

Representative samples of the three grades of back fillet meat from Blue and Fin whales were hard frozen immediately after removal from the carcass and kept at −22° C. (−8° F.) in a special small refrigerator on board the factory ship. In the course of the six months that elapsed before they were analysed some drying would have taken place, but this was reduced to the minimum by wrapping in waxed paper and taking samples from the middle of the pieces of meat. The water on a fat-free basis was, in fact, exactly the same as that of lean beef, and the analytical values can therefore be taken as exactly comparable with those for beef.

From the nutritional point of view it is desirable to know the total nitrogen, its distribution between protein and non-protein nitrogen, and the amount of fat. Useful indices of the relationship of the meat to that of other meat animals are the amounts of such components as phosphorus, carnosine, and creatine; and *p*H (acidity) is a useful index of nutritional condition of the live animal, because it is related to the glycogen content of the muscle.

The value of these constituents for twelve specimens of whalemeat, five of Blue and seven of Fin, variously graded A, B, and C, is given in Table 1.

The main interest in these data lies in their relationship to similar data for other types of meat. The Atwater and Bryant tables[4] for beef, for instance, give ("Rump, no visible fat"): water, 73·9 per cent.; protein (N × 6·25) 21·2 per cent.; fat 3·8 per cent. The protein so calculated is, of course, far too high. A more accurate approximation is 90 per cent. of the solids-not-fat, *i.e.* 20·1 per cent., which is still higher than that of whalemeat of the same fat content. The difference is accounted for by the much higher proportion of extractives in whalemeat. Complete analyses of samples of meat, including all the major extractives, are non-existent. One can only study the data for whalemeat in relation to the data scattered through the literature for the muscles or meat of other species. In a review of the composition of meat,[5] one of the authors drew up a table of the composition of "typical" mammalian muscle, and it is interesting to compare the range of values encountered in a number of samples of whalemeat with the corresponding items in this table. (Table 2. Values are percentages.)

The carnosine and "anserine" values are high, but the abnormally high "anserine" values should be accepted with reserve, since they are difference values and depend on the absence of any other peptides in the final extract following Zapp and Wilson's method.[6] Carnosine and "anserine" act as buffer substances in muscle, and in consequence we find that in spite of the high lactic acid content of whalemeat its *p*H (acidity) lies between 5·3 and 5·9 and is therefore no different from beef, the *p*H of which lies as a rule between 5·4 and 5·8.

The high buffering power is very likely to be associated with the diving habits of the animal. A normal dive lasts about ten minutes, and for the greater part of this time there is no oxygen to remove the lactic acid produced in the muscles.

Palatability of Frozen and Canned Whalemeat

Tests carried out on frozen whalemeat with the personnel of, and visitors to, the Low Temperature Station as subjects have shown unequivocally that whalemeat is an acceptable meat food. In the course of the tests 150 different people were invited to give their opinion on samples prepared for the table in various ways. The most exacting test was of whalemeat presented in the form of fried steak. In this form the dark colour of the flesh (especially that of C grade meat) and the absence of an edging of fat was commented upon, but all subjects agreed that steaks from Grade A meat were excellent in flavour and as tender as the tenderest beef. Steaks from grades B and C meat are tougher in texture and coarser in flavour. Only occasionally a slight fishiness in flavour could be detected at the edge of the steak. Fishiness was also noticed in the odour of the meat when cooking, but, except as mentioned, was absent from the cooked product.

Whalemeat canned by itself has a mild and not unpleasant fishy flavour, but canned with vegetables, for instance, this is not evident and the meat is scarcely distinguishable from beef. According to preliminary observations the fishiness seems to arise from oxidation products of fat reacting with protein to give methylamines, which are driven off during cooking. In the straight whalemeat canned pack the methylamines cannot escape so freely and would therefore produce the observed fishiness. It is not known whether the absence of fishiness in seasoned canned packs is due to chemical reactivity or to a simple masking effect. Trimethylamine oxide from which in fish trimethylamine is produced was not present in the whalemeat samples examined.

The samples carried at −22° C. (−8° F.) were in slightly better condition than others brought back in a ship's refrigerator at a temperature (probably fluctuating) in the region of −10° C. (14° F.). Nevertheless, various cooked meat products, such as rissoles, pasties, meat rolls, and sausages prepared from the latter meat, were judged by 80 to 90 per cent. of the subjects to be indistinguishable from their counterparts made with beef. The minority were divided as to whether the whalemeat items were better or worse than beef. In no case was any mention made of the presence of a fishy flavour.

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Rust-Proofing Tin

A SIMPLE process for preventing or reducing corrosion and rusting of tinned steel has been developed by the Tin Research Institute of Great Britain. The method consists of immersing the tinplate sheets or tinned articles in a hot oxidising chemical solution for a few seconds. The articles are then rinsed in water and dried so as to leave on them an invisible protective film.

This process, called the "Protecta Tin Process," can be used for treating electro-tinned steel fabricated components, for treating the exterior surfaces of food cans, and for protection against staining produced inside cans by foodstuffs containing sulphur.

Fuel Economy in the Factory

FRANK H. SLADE, A.M.I.Mech.E.

It has been stated that the development of existing coal mines and the exploitation and development of new areas with their immense reserves of coal will take at least ten years, with no immediate increased yield from the mines already in use. It is estimated that the output to be expected before the mines are fully reorganised and mechanised will not be much beyond the present output of 180 million tons a year, or 60 million tons less than the average annual production of coal over the quarter of a century before the war. The need for taking the best advantage of every pound of fuel is especially important at this juncture. This article touches upon some of the outstanding sources of fuel loss and its remedies.

ASSUMING that a boiler house is properly equipped, losses will only occur at the boiler house through lack of staff to carry out routine servicing, or by the omission to institute a routine servicing system. Unfortunately, too many factories operate on the rather primitive method of calling for a millwright or other tradesman when things go wrong; this practice should be discountenanced, for what is required in many cases is a preventive service which ensures economy in plant and in the materials and labour involved in overhauls, thereby avoiding serious hindrance to production caused by breakdown. Weekly progress meetings can, to a very large extent, alleviate the difficult duties of the service engineer in many factories, for by this means he can anticipate probable plant overloads and changes in manufacturing processes, as well as voice his disapproval when plant and equipment are abused by process workers. It should, however, be stressed that the first aim of an efficient factory maintenance organisation is to prevent trouble rather than to correct what may have gone wrong; therefore, while attendance at factory progress meetings greatly assists to this end, a properly planned and coordinated maintenance service is essential.

Proper Maintenance

The very urgent need to save fuel and the resultant study of steam generation and boiler plant performance on a national scale has revealed that the lack of proper maintenance is not just a wartime evil, but that in many instances the condition of boiler plant was so poor that efficient operation was impossible, producing conditions whereby not only is there wastage of a material in short supply, but unnecessary increased operating costs. The Ministry of Fuel and Power* has listed the chief causes of low boiler efficiency, many of which are aggravated by improper maintenance; these are:

1. Admission of air greatly in excess of the quantity required to burn the fuel—

   (*a*) Through or over the fire or both.
   (*b*) Through cracks in the brickwork setting.
   (*c*) Through spaces between the boiler and its brickwork.
   (*d*) At badly fitting access doors, damper slots, superheater cover boxes, etc.

In addition to the loss of heat, wastefully absorbed in raising the temperature of this excess air, the effect of leakages is cumulative. The total volume of flue gases to be handled is increased, with a bad effect on the draught. Induced draught fans are overloaded, calling for an increased output from the motors or engines driving them.

2. Inadequate control of combustion due to:

   (*a*) lack of facilities for the correct adjustment of dampers, and even absence of dampers.
   (*b*) Incorrect control of forced and induced draught.

3. Dirty boiler surfaces and flues retarding the rapid transfer of heat from the flue gases to the water and steam.

4. Short circuiting of the flue gases, causing diversion of the hot gases from their normal path and so preventing the transfer of heat to some of the heating surfaces, thereby increasing the stack losses.

5. High loss of heat from the outside surfaces of the plant caused by excessive radiation due to absence of lagging or to poor or inefficient lagging of exposed boiler drums, steam pipes, and hot feedwater pipes.

6. Losses of steam and hot water, due to leakages from valves and flange joints.

7. Incomplete burning of the fuel, resulting in a

* *Fuel Efficiency Bulletin No.* 38, February, 1945.

high loss of carbon in the ashes. This is not usually caused by poor maintenance, but if the grate is not in good condition the loss is aggravated.

Many of these losses can be remedied by periodic inspection, and prompt attention to details causing the fault. Such treatment will not only maintain boiler-house efficiency, but assist in preventing what may lead to a major breakdown. However, losses in the actual boiler house cannot always be attributed to lack of maintenance, for contributory actions 2 and 7 can be caused by incomplete boiler-house equipment. Factor 5 is essentially one of heat insulating materials, while Factor 3 can quite easily be aggravated by inadequate equipment for cleaning deposits which occur on the heating surface of a boiler unit. In addition, load distribution between a number of boilers operating in parallel and intermittent operation of boiler plant have a marked influence on the overall efficiency and the coal consumption.

Indicating Instruments and Boiler-house Equipment

In many industrial plants, particularly in smaller installations, where in some cases the boiler house is simply regarded as a necessary evil, the possibility of installing instruments is regarded as unnecessary, and frequently, even if they are installed by the management, they are ignored by the operating staff, very largely on account of the fact that the latter do not appreciate the value of the readings obtained.

Admittedly, Board of Trade Regulations make the fitting of certain instruments compulsory, notably water-level indicators and pressure gauges; and, unfortunately, in many instances there are quite a few installations with only these two instruments fitted.

Carbon Dioxide

The importance of carbon dioxide cannot be over-estimated, for it is only by analysis of the flue gases, together with their measurement, that stack losses can be determined. For example, excess air caused either by air leakage or inefficient operation will be indicated by a high oxygen and low carbon dioxide content. Insufficient air will likewise be indicated by the presence of combustible gases.

Therefore, in order to ascertain and quickly correct the causes of stack losses affecting the efficiency of combustion, it is essential that the carbon dioxide is recorded at the boiler outlet.

It will be observed that the carbon dioxide is always less at the chimney base than at the boiler outlet, due to air leakage into the flues and casings. This varies in different boiler units, but as air leakage, indicated by reduction in carbon dioxide content, means loss of fuel, a careful check should be kept upon this leakage.

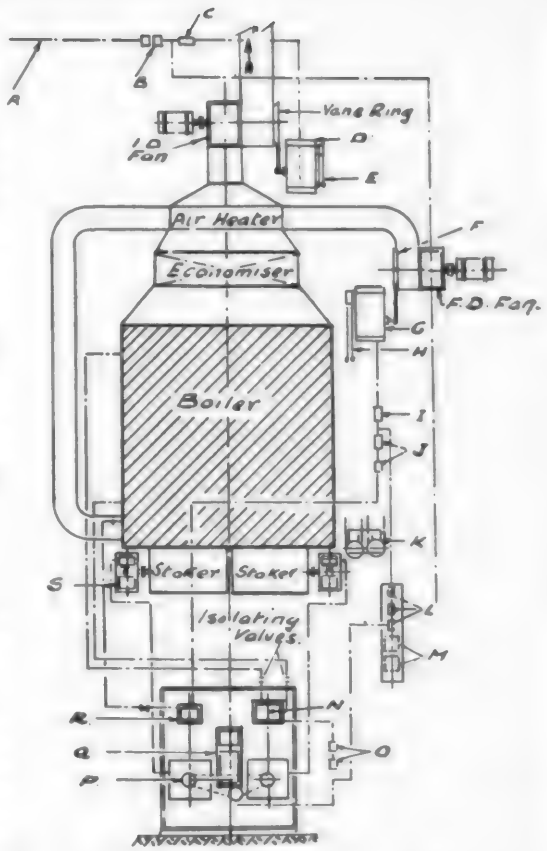

Fig. 1.—Diagrammatic layout of automatic combustion control system.

A. Connexions to visiting master controller in control room.
B. Control switches mounted on panel in control room.
C. Contactor.
D. I.D. Vane control gearbox.
E. Wire rope to hand control gear.
F. Vane ring.
G. F.D. Vane control gearbox.
H. Wire rope to hand control gear.
I. Contactor.
J. Control switches mounted on panel in control room.
K. Hand control gear for F.D. and I.D. fans.
L. Control switches mounted on panel.
M. I.D. and F.D. speed control switches.
N. Fuel/air ratio controller.
O. Control switches.
P. Handwheel for hand control of regulators.
Q. Regulation control gearbox.
R. Furnace pressure controller.
S. Stoker motor.

The difference in carbon dioxide at the boiler outlet and the chimney base is a direct indication of air leakage; any increases in such difference will indicate increased air leakage.

A useful piece of equipment for this purpose is the chimney loss recorder, which gives a record of the actual amount of heat lost from the boiler plant at the base of the chimney.

The temperature of the flue gases leaving the boiler is a valuable indication of its state of fouling, for the temperature of gases leaving a boiler, economiser, etc., rises in many instances, thus providing a valuable indication when cleaning is necessary—a feature of boiler maintenance that, owing to the variable quality of present-day coal, cannot be adjusted by routine cleaning. After a period of operation it will often be found that the superheated steam temperature will tend to rise, owing to reduced heat absorption occasioned by deposits between the tubes in front of the superheater; thus higher temperature gases will sweep the superheater, which, if allowed to rise too high in temperature, may seriously damage the tubes.

Steam Flow Meters

Steam flow meters, apart from providing valuable data for the factory engineer to assist in estimating the operating efficiency of the plant under his control, are useful to the boiler-house staff, especially in factories where there is a fluctuating steam demand, since they show the exact output of steam at any moment, and also indicate sudden increases and decreases in the steam demands.

The utilisation of steam flow meters can advantageously be extended outside the boiler house for departmental use. Citing but one illustration, it is reported that the flow meter chart showing the twenty-four-hour record of steam consumption in the pig-killing department of a Chicago factory indicated consumption of steam from 6 p.m. to 6 a.m., when the department should not have used steam. Investigation disclosed that steam had been permitted to leak into the hot water heater all night, someone having neglected to close the steam valve. The loss was 111,600 lb. of steam, one that might have been exceedingly difficult to find and correct if steam meters had not been installed.

The value of smoke density meters cannot be over-estimated; several types of these are available, giving the density of smoke in terms of the Ringelman chart.

It is advantageous to know both the pressure and temperature of the air before it enters the boiler furnace; also it is most important to be cognisant with the air pressure beneath the grate and the suction in the furnace, for, if conditions are such that a pressure occurs in the combustion chamber, increased maintenance to furnace fittings and refractory lining can be expected.

An essential feature of boiler-house operation is periodic estimation of operating efficiency; this should be carried out weekly. Many engineers are, however, unable to accomplish this satisfactorily owing to the lack of necessary equipment, for it is essential for them to know both the output of steam, together with the steam conditions, and the input in the shape of fuel, together with its calorific value.

It is apparent that to secure efficient combustion the means must be provided whereby this can be effected, for, unless they are, it is like asking a modern business office to complete the daily outgoing correspondence with a quill pen. As efficient combustion relies on correct boiler-house equipment to indicate when control is necessary, so economy of fuel relies upon the facilities for effecting efficient combustion.

This problem has received the attention of engineers for many years, and as a result automatic control has been applied to both water tube and Lancashire boilers in the endeavour to improve combustion efficiency and to eliminate the human factor in operations which can usefully be performed by mechanical means. Wastage of fuel is prevented, or improved combustion efficiency is effected, when load changes are immediately perceived, and while this can be effected by the human operator if he were always on the alert and carrying out these duties to the exclusion of all others, it will not be with such rapidity of response to load demand as the mechanical device, which is always prepared to receive and deal with any fluctuation.

The main essentials of an automatic combustion control system are shown diagrammatically in Fig. 1, from which it will be seen that such an installation combines extreme simplicity of layout with comprehensive control.

Insulation Losses

While unwarrantable heat losses may occur through lack of attention to the adequate insulation of a boiler, pipework, and other surfaces, the proper insulation of brickwork settings, flues, etc., should not be disregarded, for not only will efficient insulation reduce fuel consumption, but the possibility of boiler settlement and resultant damage to pipework connections, fittings, etc., will be considerably minimised.

Settlement is often caused by the drying out and shrinkage of earth beneath the boiler raft, also by actual ignition of the make-up ground when this is composed of a mixture containing combustible matter. Insulation between the concrete raft and boiler setting will reduce soil heating and the danger of boiler settlement.

Developments in heat insulating materials in the form of "hot face" insulating bricks and heat insulating concrete have been advances that lead to important economies. "Hot face" bricks find a ready application to the lining of second pass and

onwards of water-tube boilers and the side and bottom flues of Lancashire boilers, also to connecting and main flues leading to economisers, etc., especially where these are exposed externally to low temperatures.

Heat insulating concrete is used to reduce soil heating, also for the important application of paving the floors of Lancashire and similar boiler flues, beneath economisers, main flue, as a sandwich course between lining and outer common bricks of exposed flues and so on. A typical specification for a Lancashire boiler setting which may be used as a basis is as follows:

Downtake Walls.—4½ in. good quality brickwork on inner face and 4½ in. "hot face" insulating brickwork on outer face.

Paving of Boiler Flues.—4½ in. to 6 in. on insulating concrete superimposed on concrete raft.

Sides of Boiler Flue.—"Hot face" insulating bricks 4½ in. thick on common brick backing.

Boiler Fouling

As already stated, the extent of foulness of a boiler is indicated by rise in temperature of the flue gases leaving the boiler, the nature and extent of the deposits which occur on the heating surfaces having a direct bearing upon boiler efficiency.

It would be extremely difficult to attempt to forecast the rate at which fouling takes place, more especially when a number of different coals are used in the same boiler house. This should place more importance on the need for proper indicating equipment and the provision of adequate soot blowing apparatus, especially when the figures for reduction in the passage of heat due to fouling are scrutinised.

The accumulation of soot on boiler and oven plates reduces the passage of heat according to the following table:

Soot Thickness (In.).	*Passage of Heat (Per Cent.).*
0	100·0
0·05	86·3
0·10	77·4
0·20	64·0
0·30	55·0
0·40	49·0
0·50	45·3

It should be stressed that clean surfaces and flues are essential to rapid steam raising, and that dirty internal and external surfaces and flues result in a high outlet gas temperature with consequent high stack losses and considerable fuel wastage.

The problem of boiler fouling cannot be passed without mention of reduced boiler performance due to incrustation. Scale formation can be reduced by regular blowing down during operation and changing the water in the boiler at regular intervals. Attention should be given to the removal of scale by chipping and scraping when the boiler is opened up, for increase in depth of incrustation rapidly increases fuel wastage; for example, scale $\frac{1}{16}$ in. thick will increase the quantity of fuel required for evaporation by 15 per cent., $\frac{1}{8}$ in. thick by 38 per cent., $\frac{1}{4}$ in. thick by 60 per cent., and $\frac{1}{2}$ in. thick by 150 per cent.

Load Distribution and Intermittent Operation

In plants where two or more boilers are operating at a time, the load distribution between these boilers has a marked influence on the overall efficiency and coal consumption.

According to Kaufmann,* for the minimum fuel consumption of a boiler plant consisting of several boilers the correct load distribution between the boilers in operation at any given time is as important as the maintenance of the maximum possible efficiency of each individual boiler. With boilers having similar input-output characteristics, the total load at any given time should be so divided between the respective units, that the rate of increase in input to output, as determined by their individual characteristics, is the same for all units.

If for special reasons a group of boilers is to be operated at a constant base load, the least economic units should be selected for this task, while the fluctuations should be carried out by the most efficient boilers of the plant.

A boiler should be banked when the total plant output decreases, if the total output is smaller without that boiler in operation than when it is steaming. Conversely, it should be put back in service again when, with increasing demand on the plant, the required total input with that unit steaming is less than if it were out of service. In practice due attention has to be paid to the excess input necessary to make up for stand-by losses, and it will be found more economical to operate boilers at the possible minimum load than to bank them.

Automatic boiler control will greatly facilitate the maintenance of correct load distribution; the cost of the additional control equipment required will be negligible compared with the extra benefit obtained.

The loss in boiler efficiency due to fluctuating steam demand can be partly offset by the provision of steam and hot water accumulators, but the heat losses due to intermittent operation of the boiler is a much more complex problem. Unlike most other machines, a boiler does not stop dissipating energy after it has been taken off the line, for the large amount of heat stored in the boiler proper, the water, brickwork, casing, etc., is slowly dispersed by radiation and convection. At the beginning of a stand-by period these losses exceed even the

* "Distribution of Boiler Load." Paul G. Kaufmann. *Proceedings I. Mech. E.*, 1942, vol. 148, No. 2, p. 42.

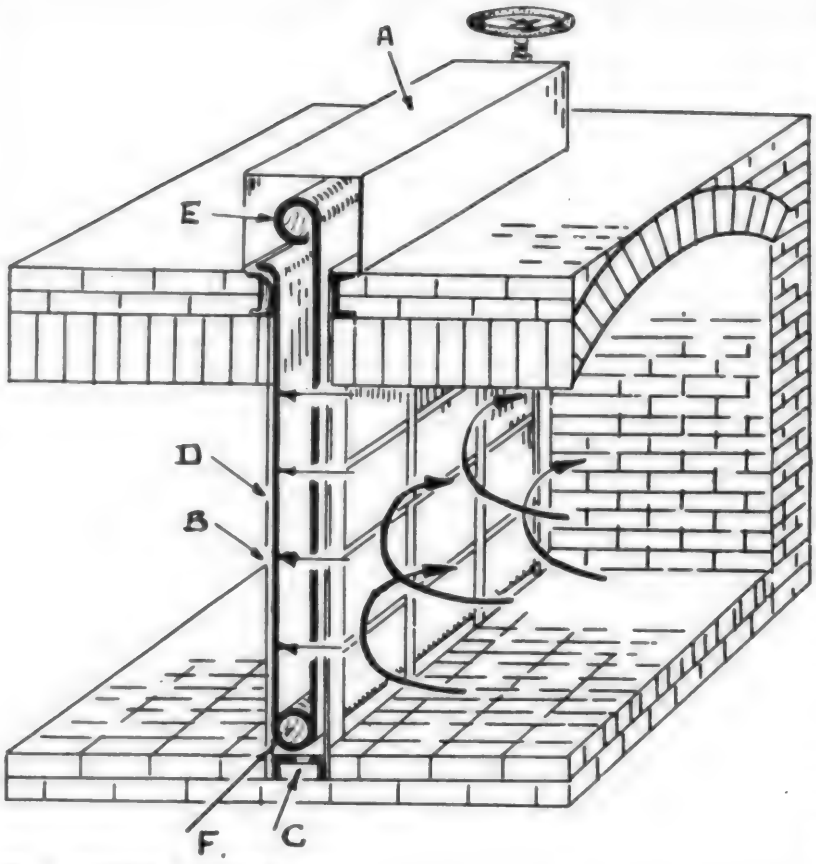

Fig. 2.—Flexible gas-tight damper.

A. Casing. B. Lattice. C. Frame. D. Flexible curtain. E. Roller. F. Weight.

radiation losses during operation, as heat is dissipated also from the main boiler surfaces.

When the boiler is started again this heat has to be restored, and there are also unavoidable stack losses until the fuel bed is in its proper condition. Table I shows the various losses occurring in connexion with intermittent operation of boilers.

However, provided the heat stored in the brickwork can be retained over long periods, it can be used as a latent force for quick and economical starting up of boilers. This heat storage will vary with the type of boiler and setting; thus, for boilers such as the economic type or water-tube boilers with completely cooled furnace the heat storage is stated to be only 150 to 250 Btu/sq.ft. and 150 to 300 Btu/sq.ft. respectively, while for a Lancashire boiler with brick walls it can be as high as 15,000 to 20,000 Btu/sq.ft.

When a boiler is heated up from the cold state, the brickwork increases gradually in temperature, taking a considerable period of time before some parts reach the maximum temperature.

All the heat absorbed by the brickwork has been obtained from the fuel burnt, and part of it is lost every time the boiler is shut down for short periods, such as overnight. A small amount of heat may be lost by radiation, but by efficiently insulating the boiler this can be brought down to a minimum. A much larger amount may be lost by cold air drawn through the flues during stoppage as a result of badly fitting dampers. This "internal cooling loss" is one of the losses which have usually been accepted as unavoidable.

In most cases when boilers have to be stopped for several hours the pressure is maintained by banking; this, however, cannot prevent the cooling of the boiler walls, although the water content may be kept warm; in fact, the internal losses increase, for the dampers must be kept open to allow the gases to escape, resulting in more air entering the boiler. It has been found that by fitting with flexible dampers, such as shown in Fig. 2, economies as high as 4 per cent. have been secured during shut-

TABLE 1*

Kind of Loss.	*When Occurring.*	*Reason.*	*Remarks.*
1. Stopping loss.	During stopping of boilers.	Low CO_2 (high flue gas loss). Combustible in refuse. Sensible heat of fuel.	Only with grates.
2. Cessation loss.	During period of shut-down.	Cooling of boiler cement, metal parts, brickwork.	Independent of kind of furnace equipment.
3. Starting loss.	During starting of boilers.	Low CO_2. Combustible in flue gas (smoke). Combustible in refuse.	Independent of kind of furnace equipment.

* "Losses Due to Intermittent Operation of Boiler Plant." B. F. Karthauser, *Journal of the Institute of Fuel*, February, 1939.

down over the commonly employed method of banking fires, the boiler walls being warm enough to start fires independently, even after a shut-down period of eight to ten hours.

These flexible dampers have been used successfully on the Continent and in this country, being installed either in the main flue or in addition to existing dampers in the boiler flue.

Factory Losses

Probably the first answer to factory loss that arises to mind is insulation of all heating surfaces. However, many factories have, due to rapid growth, been forced to extend their steam lines rather haphazardly, with the result that losses are encountered that could, with a little careful reorganisation, and in many cases by using existing materials, be considerably reduced.

Careful maintenance of steam traps, valves, pipe joints, and the utilisation of the waste steam are all matters that show vividly in the profit and loss account of fuel economy. However, provided these sources of loss are properly cared for, the operating efficiency of a boiler plant is considerably lower when operating for long periods than shown during a short guarantee test. The reason for this is usually due to fluctuating steam demand, a requirement which in many food factories may, for short periods, reach a maximum of 50 to 80 per cent. of the normal evaporation, a state of affairs that, even with anticipated load, adequate boilers, and skilful firing, can only be met by firing the boilers beyond their normal capacity.

Even when using Lancashire boilers, which provide a steam reserve of 15 to 20 per cent. and an overload of approximately 30 per cent. at any given moment, the efficiency under fluctuating load falls far short of that achieved when operating under steady load. Automatic control assists by meeting fluctuations rapidly, but in the majority of cases a steam-raising plant benefits by the employment of steam and hot-water accumulators.

The system of storage usually adopted is to employ an exhaust steam surface heater in series with a live steam heater, the former using exhaust steam from prime movers and auxiliaries, and the latter taking surplus steam from the main steam supply.

Thus, with firing at a reasonably constant rate, the surplus steam generated during low load periods may be usefully employed in storing heat for use when peak load occurs.

All variations in the demand for hot water and the rate at which it is generated are covered by the rise and fall of water level in an elevated storage tank of sufficient capacity, which is incorporated in the system.

Complete Utilisation of Heat

Overall factory heat efficiency is governed by the utilisation of heat as long as there is work for it to do. This means that, so far as is possible, a factory should be considered as a single heat-using unit; thus, instead of heat being supplied to several separate points of consumption and the surplus going to waste, the process line should be so arranged, without interfering with production, that waste heat from one stage in the process should, if possible, be usefully employed in another stage.

In many cases when large quantities of low-pressure steam are required it may be advantageous to employ triple expansion engines to drive generators for electricity supplies, utilising the exhaust steam for process work.

It has been found that by employing thermal linkage savings as high as 23 per cent. of the total fuel bill have been achieved.

In conclusion, while the boiler house may be regarded as a necessary evil, the intelligent utilisation of its products—heat supply—results in considerable fuel savings and attendant reduction in operating costs.

The points to be stressed in achieving this end are routine maintenance, adequate indicating instruments, the possibility of automatic control and heat accumulators, attention to heat conservation during periods other than steaming, correlation between production, maintenance, and engine-room staff, and careful replanning of factory and boiler-house plant, which should include thermal linkage.

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Fluorine in Calcium Acid Phosphate

The following is an extract of the report issued by the Inter-Departmental Committee following receipt of a memorandum from the Manufactured Foods Division of the Ministry of Food requesting their advice on the proposal to make an Order prescribing maximum limits for the fluorine content of calcium acid phosphate (A.C.P.) sold for use in food and certain articles containing it.

THERE are two processes used for the manufacture of A.C.P. In one (by which about 80 per cent. of the total output of A.C.P. is made) phosphorus is used as the raw material and the product is of a high degree of purity. In the other process, rock phosphate is used and the product is contaminated with fluorine compounds. The Committee has been informed that manufacturers using this process claim that they have been selling A.C.P. containing as much as 3,000 p.p.m. of fluorine for many years without exception being taken by Food and Drugs Authorities.

The possibility of harmful contamination of foods with fluorine has been giving concern to Public Health Authorities. From 1942, Food and Drugs Authorities brought proceedings in certain cases under the Food and Drugs Act, 1938, in respect of baking powder or articles containing it contaminated with fluorine, but they failed in some of them to obtain a conviction.

In August, 1943, the Society of Public Analysts and Other Analytical Chemists, which had been giving consideration to this question, issued a statement recommending that no action should be taken under the Food and Drugs Act where the following proportions of fluorine, however combined, were not exceeded:

In acid phosphates	..	200 parts per million.
In baking powder	..	70 ,, ,, ,,
In golden raising powder	..	50 ,, ,, ,,
In self-raising flour, cake mixtures, and like compositions	..	5 ,, ,, ,,

Nevertheless, in the absence of a legal standard it is difficult to convince a Court that where any of these proportions is exceeded an offence has been committed.

Definition by Regulation

In view of this unsatisfactory situation, several Authorities have proposed that limits should be defined by Regulation. Manufacturers have also urged that steps should be taken to clarify the position, and at the invitation of the Committee the manufacturers submitted a report of work carried out on their behalf by H. E. Archer, M.R.C.S., L.R.C.P., F.R.I.C., and B. Leech, M.A., F.R.I.C.

In this report it was suggested that:

(i) In the combination in which it occurs in food products after aerating ingredients have interacted, fluorine is insoluble in normal gastric juice even when the acidity approaches the upper limit of normality. Further, phosphates present in a food after interaction of the aerating ingredients buffer the gastric juice at a *p*H on the alkaline side of neutrality so that any fluorine present is insoluble and unabsorbable.

(ii) Within the limits of experimental error, any fluorine ingested in the form of baking powder containing contaminated A.C.P. after interaction of the aerating ingredients is excreted completely in the faeces.

The report was discussed at a meeting between the manufacturers' representatives and the Committee. The Committee pointed out that since the experiments described related to only one adult, who was on a high milk diet, the results could not be accepted as evidence of what might take place in the case of other persons, especially children, taking a more varied diet. Dr. Archer, however, indicated that the case for the harmlessness of fluorine rested not merely on the experiments described in the report, which he recognised as being chiefly of a confirmatory nature, but also on the fact that mottling of teeth is rarely if ever found except where the water supply is known to be contaminated.

He asserted that this condition was a highly sensitive indicator of fluorine absorption, and since A.C.P. contaminated with fluorine was extensively used, the absence of mottling of teeth showed that fluorine was not absorbed from A.C.P. It was further asserted that even if widespread mottling had occurred, the condition was to be regarded merely as a cosmetic disability and not as evidence of the toxicity of fluorine. Reference was made to work by Roholm stated to show that cryolite workers enjoyed excellent health and that comparatively large amounts had to be ingested daily for many years before any symptoms developed. It was stated further that investigations in this country had failed to reveal any radiological evidence of skeletal changes in either adults or children with mottled teeth, except in undernourished children from bad homes. The manufacturers' case, therefore, was that fluorine was not absorbed from A.C.P. and even if absorbed was harmless. On the other hand, the Committee's attention was drawn to various statements in medical literature suggest-

ing that mottling of teeth is more common than usually supposed. Moreover, with other toxic elements—for example, lead—almost complete excretion in the faeces does not necessarily justify the assumption that oral ingestion is harmless.

The Committee Investigation by the Medical Research Council

The Committee felt that the arguments advanced by the manufacturers could not be dismissed without further investigation, and that their validity could be assessed only by persons having the requisite physiological and toxicological knowledge.

The following questions were accordingly addressed to the Medical Research Council:

(1) Is there any authoritative evidence that injury to human health has resulted from the absorption over lengthy periods of small amounts of fluorine from food other than water?

(2) Is it true that widespread mottling of teeth in the community does not occur?

(3) If the answer to question (2) above is in the affirmative, can the absence of widespread mottling be accepted as evidence that absorption does not occur at all or not to any harmful extent?

(4) Having regard to the available evidence including that advanced in the report prepared by Dr. Archer and Mr. Leech, is it in the opinion of the council desirable that an Order should be made limiting the amount of fluorine in calcium acid phosphate?

(5) If the answer to question (4) is in the affirmative, what limit should be imposed?

The following specific answers were given to these questions:

(1) Answer is *no*, because so far no one would have recognised the effects of such ingestion; analysts have only been interested in fluorine determinations in recent years and pathologists have not clearly established the criteria of milder forms of chronic fluorosis.

(2) Answer is *no*: in any case mottling of enamel is not the most suitable indication of fluorine ingestion except by the water supply.

(3) Animal experiments have shown that fluorine is ingested by pigs, rabbits, rats, cattle, sheep, and dogs from food, pasture, and rock phosphates. Widespread fluorosis occurs in cattle and humans in Algeria, one of the regions from which much rock phosphate is obtained. The ingestion of fluorine from rock phosphates, besides producing the well-known bone changes, produces in different species different effects, including pathological changes in the mucous membrane of the alimentary canal, and nephrosis.

(4) Yes, an Order should be made.

(5) The limit for calcium acid phosphate should be 300 p.p.m.

In recommending that the limit be somewhat higher than was suggested by the Society of Public Analysts and Other Analytical Chemists, the Council stated that in their view a limit of 300 p.p.m. would still be safe having regard to the proportion of A.C.P. which is used in foods containing it.

In amplification of these answers the Council stated that in their opinion it is essential that a limit be set for the amount of fluorine permissible in any material used in food production, and suggested that the safest procedure would be to prohibit the use of A.C.P. made from rock phosphate for food purposes. The view was expressed that since the effects of fluorine are cumulative, absorption from the alimentary canal could only be proved or disproved by determining the urinary excretion of fluorine during administration over a period. The argument that the absence of mottling of teeth showed that absorption does not occur was criticised on various grounds. In addition, it was suggested that Roholm's monograph on fluorine poisoning, the recent work of Ockerse in South Africa and Shortt in India, and reports from industries using fluorine compounds, all tended to show that fluorine was a potentially toxic contaminant.

Possible Effects of an Order

In view of the possible effect such an Order would have on certain manufacturers it was felt desirable to ascertain more fully the grounds underlying the Council's recommendation, and Dr. Margaret Murray, who had advised the Council on the matter, kindly attended a meeting of the Committee to provide further information.

Dr. Murray suggested that it was not justifiable to base any opinion on a short-term experiment, since, for example, in the parts of India where fluorosis is endemic the effects may not become evident for twenty-five to thirty years. She considered that the balance found by Dr. Archer and Mr. Leech in the intake and excretion of fluorine by their patient must have been largely fortuitous, because, apart from the difficulty of accurately determining small quantities in the excreta, fluorine is cumulative and the fluorine excreted on one particular day is not necessarily that ingested the previous day. She agreed that small amounts in drinking water had a beneficial effect in tending to prevent caries, but was nevertheless of the opinion that this did not justify the ingestion of fluorine in larger quantities or from other sources.

The further evidence provided by Dr. Murray may be summed up by saying that fluorine, if absorbed in small quantities over a sufficient period of time, can produce gross lesions of bone; there is abundant evidence from animal experiments and analyses of human bones that fluorine can be cumulatively absorbed; and there is radiological evidence that a mild spondylitis occurs in some children living in areas where the drinking water contains fluorine, although it is possible that the affection occurs only in those children whose nutritional state is poor.

The Committee records their appreciation of the assistance rendered by the Medical Research Council and by Dr. Murray. In view of the unquestionable harmfulness of large amounts of fluorine, and of the cumulative effect of small doses, it is felt

that the risk to the public health from the repeated ingestion of small amounts of fluorine is too serious to be ignored, and that an Order should be made prescribing maximum limits for the contamination.

With the evidence at present available, it is only possible to make an approximate estimate of the maximum amount of fluorine which can be ingested daily over a period of years without harmful effect, and in fixing a limit for fluorine in A.C.P. it must be remembered that products other than calcium acid phosphate may contribute small quantities of fluorine to the total intake. The Medical Research Council are, however, satisfied that a limit of 300 p.p.m. of fluorine in A.C.P. would be safe, and, for the reasons indicated above, it is considered that this figure should be adopted as the maximum limit.

Proposed Maximum Limits

An Order prescribing limits only for A.C.P. and sodium acid pyrophosphate would fail to achieve its object. These substances are not bought by the public as such, and samples would not often be submitted for examination under the existing arrangements for ensuring the purity of food. The articles in which these phosphates are likely to be used are those containing aerating agents, such as self-raising flour, baking powder, and products sold as cake or bun mixtures. Since these contain other phosphorus compounds, it is not possible to determine the proportion of A.C.P. or sodium acid pyrophosphate with accuracy, and an analyst would have the utmost difficulty in convincing a Court that a particular sample containing an abnormal amount of fluorine had been made with a phosphate not complying with the statutory requirements. It is therefore regarded as essential that maximum limits be prescribed by Order for the more widely sold foods which are likely to contain fluorine-contaminated food phosphates.

Information as to the proportions of acid phosphate in the food products now on the market has been supplied by the Manufactured Foods Division of the Ministry of Food. A wide range is shown in each type of product, and if a limit for fluorine were based on the maximum proportion of acid ingredient, a phosphate containing much more than 300 p.p.m. of fluorine could be used in the manufacture of a powder of lower aerating power for which a smaller proportion of the acid phosphate would be needed. The Committee feel that if a manufacturer wishes to supply a product having an unusually high aerating power, it is not unreasonable under present conditions to require him to use as the acid ingredient in whole or in part a substance such as tartaric acid, which is not liable to contamination with fluorine.

Only a small minority of the baking powders on the market contain more than 30 per cent. of A.C.P. or sodium acid pyrophosphate. The Committee recommend that the fluorine limit for baking powder be one-third that for A.C.P. itself—that is, 100 p.p.m. "Golden raising powder" contains on the average a somewhat lower proportion of aerating ingredients than baking powder, but the difference is small and it is recommended that the same limit be prescribed for both kinds of product.

Self-raising flour, cake and bun flours, batter mixtures, and similar products comprise a further class of foods containing A.C.P. In the majority of these the A.C.P. content does not exceed 2½ per cent. Since in use they generally constitute the sole farinaceous ingredient of the consumed goods, it would be appropriate to set a limit of 8 p.p.m. to the fluorine content of this group.

The Committee are aware that a few products in this class may contain a higher proportion of A.C.P., but makers of these particular products should be able, by proper selection of ingredients, to conform to the standard.

In suggesting these limits, the Committee have borne in mind the possibility that flour itself especially when fortified with chalk may contain traces of fluorine. Such traces are, however, small in comparison with the amount introduced by the phosphate and no special provision is necessary.

The Committee accordingly recommend that an Order be made prescribing the following maximum limits for the fluorine content of the foods specified:

(*a*)	Calcium acid phosphate and sodium acid pyrophosphate, when used for food purposes ..	300 parts per million.
(*b*)	Baking powder and golden raising powder ..	100 ,, ,, ,,
(*c*)	Self-raising flour and other food products containing aerating ingredients	8 ,, ,, ,,

Oil Coating of Apples

THE most effective method of increasing the life of apples in unrefrigerated storage is to coat the skin with castor oil and shellac in alcohol, according to a report by the New South Wales Department of Agriculture. Disadvantages are that the treatment sometimes produces lenticel spotting and an alcoholic flavour.

Emulsions of wax in oil, although most effectively controlling loss of weight, cause injury and do not prevent discoloration. By the use of oils, weight loss in some types of vegetables can be reduced by 50 per cent.

Superficial scald of Granny Smith apples is prevented by wrapping alternate layers in oiled wraps, while an emulsion of groundnut oil considerably reduces the incidence of the disease. Wilting and colour change can be controlled to a certain extent by an emulsion of viscous medicinal paraffin oil.

British Beet Sugar

BASED on twenty years' experience in the industry, Mr. Harold Wickenden has compiled a freely illustrated booklet* relating the story of beet sugar in simple and straightforward terms.

English farmers have in the last twenty years expanded the beet crop twenty-fold; the eighteen existing factories have gradually improved their efficiency and products, and farms and factories have collaborated with the Ministry of Agriculture through a Research and Education Service to increase production and fight pests.

The author traces the life of the sugar beet from cultivation to harvesting, from field to factory, giving *en route* details of factory operations—for example, the weighing and sampling of loads, beet washing, etc. A brief insight into the conversion from root crop to sugar, molasses, and beet pulp is given.

Stressing the fact that another World War has brought home the necessity of maintaining home agriculture at a high level, the author concludes by expressing the hope that this fact alone should ensure the continuance of the production of sugar from British farms.—J. R.

* *Sugar from British Farms.* By Harold Wickenden. Pp. 44. London. 1s. net.

Feed the Brute

THE title of a newly published cookery book* is capable of raising some profound social questions. The book does not stipulate whether it is intended for the bride-to-be or the bride-that-is. If the former, it may be that the very clear pictures in the book of hands depicting the removal of entrails of fish and fowl, the filleting and frying of fish, and the manipulation of dead rabbits might possibly have an influence on marriage statistics. On the other hand, if the lady is already a bride and a beginner in cooking (the publishers say that the book is for beginners) she, or more probably her husband, may find the path to expertise deviating towards the Divorce Courts.

Be this as it may, step-by-step lessons with recipes have been chosen and the illustrations render the procedure as foolproof as is humanly possible.

In addition to everyday recipes, there is a small but comprehensive section on fruit bottling giving details of the handling of the different varieties of fruit.

One small criticism of an otherwise excellent little book is that the list of equipment needed would have been more appropriately placed in the opening pages.—J. R.

* *Bride's First Cookery Course.* By Jane Creswell. Pp. 37. London. 1s. 3d. net.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, August 1, 1946, page 330.

No.	*Date.* 1946.	PRICE FIXATION ORDERS
714	May 17.	Hay (Control and Maximum Prices) (Great Britain) Order. Revokes S.R. & O. 1945 Nos. 556, 823.
715	,, 17.	Hay (Maximum Prices) (Northern Ireland) Order. Revokes S.R. & O. 1945 Nos. 557, 824.
726	,, 20.	Biscuits (Charges) (Amendment) Order. [Emergency Powers (Defence) Act, 1939. s.2; Supplies and Services (Transitional Powers) Act, 1945. s.5.]
728	,, 20.	Order amending the Meat Products, Canned Soup and Canned Meat (Control and Maximum Prices) Order, 1944.
732	,, 21.	Order amending the Egg Products (Control and Maximum Prices) Order, 1943.
753	,, 27.	Order amending the Cucumbers Order, 1946.
805	June 4.	Order amending the Egg Products (Control and Maximum Prices) Order, 1943.
		FEEDING STUFFS
829	June 12.	Order amending the Feeding Stuffs (Regulation of Manufacture) Order, 1944.
831	,, 12.	Directions supplementary to the Feeding Stuffs (Rationing) Order, 1943. (Halving of coupon value.)
943	,, 25.	Order amending the Feeding Stuffs (Regulation of Manufacture) Order, 1944.
		FISH
941	June 25.	Order amending the Fish (Port Allocation Committees) Order, 1943.
		FRUIT
839	June 14.	Order amending the Home Grown Soft Fruit Order, 1946, and the Imported Soft Fruit Order, 1946. (Strawberries.)
		MILK
835/S35	June 13.	Milk Marketing (County of Orkney) Order.
888/S39	,, 24.	Milk Marketing (County of Orkney) (Charges) Order.
		VEGETABLES
809	June 5.	Carrots (1946 Crop) (No. 1) Order. Revokes S.R. & O. 1945 No. 1105.

Quick Frozen Foods

A. E. MILLER, M.S.E., M.Inst.R.

The development of quick frozen foods, now the war is over, is gaining momentum. Quick frozen foods will soon be everyday commodities. This article affords a brief survey of the principles of the subject.

THE chief advantage of quick freezing lies in the claim that ordinary cold storage must of necessity be for a limited period only, but quick frozen products will remain in a state of suspended animation for an indefinite period.

If ordinary frozen foods and quick frozen foods are compared under a microscope it will be seen that there is a distinct difference between the size of the crystals which the process of freezing tends to form among the flesh tissues. In slow frozen foods crystallisation is definitely larger than in quick frozen foods. Large crystals tend to disrupt and compress the flesh tissues. Broken and compressed flesh tissues set up store staleness, which after thawing out has been completed promote bad appearance and render the food unpalatable.

In the freezing of foodstuffs, particularly those

The peaches are sorted, washed in a moving trough, cut in two, and the pits removed. The split halves are then carried along the endless belt conveyor to the steaming equipment, which removes the skins.

Fibre tubs, filled with peaches, are stacked in a sub-zero room for freezing.

Trays of sealed cartons filled with sliced peaches and sugar are run into the freezing cabinet.

Above: America's locker plant system enables people to rent their lockers by the year. Packages of frozen food are stored here, each labelled to indicate contents and storage date.

Left: The basket of packaged meat goes into the quick freeze unit.

which are animal flesh, any moisture contained in the flesh tissues, which are composed of innumerable tiny cells, will naturally form ice crystals. The longer the time taken to complete the freezing the more firmly formed are the ice crystals, and the greater the liability for them to grow together, until the size is limited only by the firmness and strength of the flesh tissues.

Foodstuffs with high water content submitted to slow freezing must be slowly thawed out, otherwise the ice crystals will not have time to re-form into the moisture in the flesh tissues so that taste and appearance may be restored to something approaching the original state.

The faster the freezing the more fresh and palatable the food after thawing. Due to differences in water content and percentages of fat and bone in different foodstuffs they require different freezing speeds. The actual amount of heat to be removed is the total of the sensible and latent heat of the water content in addition to the sensible heat of the rest of the product. Generally speaking, it can be assumed that if the food product is regarded as water, and the number of degrees of temperature it must be lowered is approximately seventy, and making the usual allowance of 143 B.T.U. per lb. for latent heat, the refrigeration required can be easily assessed.

Freezing Systems

Fog freezing systems consist principally of cabinets, on the top and sides of which pipes are installed fitted with atomising sprays through which the circulating low-temperature brine is sprinkled. Between the sides of the cabinet are trays, and on these the packaged foods are placed. The high-velocity brine is atomised through the spray needles creating a fog which extracts heat from the foods on the trays. The fog, when heat-laden, condenses and the water drops into the tank below and passes into the suction side of the circulation pump for re-atomising.

There are cabinets of various capacities and most of these are fitted with storage compartments. Freezer and storage compartments usually form upper and lower chambers. The freezer is fitted with a continuous belt, usually made of wire mesh operated on two shafts rotated by a sprocket wheel and chain outside the freezer, which is revolved by a slow speed geared motor.

The foodstuffs to be frozen are placed on the

chain belt. The belt draws the foodstuffs through the freezing chamber. The speed of travel is slow and is adjusted according to the product being frozen. Small thin products require less time than thicker products.

The advantage of the brine-fog system is that, by the atomised spray, a comparatively large cooling surface is obtained. Atomised brine impinging at high velocity results in quick heat transfer by utilising the largest permissible cooling surface with the greatest possible temperature difference.

The Multi-Plate System

The multi-plate quick freezing method consists of subjecting the food products to cold from freezing plates above and below. Freezing is accomplished by contact and pressure. The plates are usually 4 ft. square. The trays between the plates usually hold approximately 1 cwt. of food products. The trays are lined with waxed paper, the food products packed closely in the paper, which is then folded over. Direct contact with the refrigerated plates usually requires thirty to sixty minutes, dependent on the quality of the food and the position of the plates.

Freezing Tunnels

Air-blast methods of quick freezing in principle consist of a tunnel or shaft through which pass the trays of food to be frozen. Cold air is directed through the tunnel at a fairly high speed and a very low temperature.

The tunnels are of various dimensions dependent on the capacity. Twenty ft. in length, by 3 ft. wide, and 5 ft. high is one size. This type is capable of handling 3 tons of food products per normal day, although with certain foods this tonnage can be exceeded. The air, previously cooled by direct expansion ammonia pipes and brine rain, passes through the tunnel at a speed of 1,000 ft. per minute. The fan should be large enough to handle sufficient air to fill the tunnel space—in this case approximately 15,000 cu. ft. per minute, and the trays of food products would fill the tunnel every thirty minutes. The time of freezing would vary, of course, with the food product and the temperature of the incoming air.

Normally air is cooled down to approximately −20° F. and is delivered at the other end of the tunnel with a temperature difference of possibly 10° F.

Large plants designed for fish freezing, or fruits, generally follow the same features of design. A conveyor belt passes through the freezing tunnel. The length and other dimensions depend entirely on the capacity. Belts are made to take one or several tons of products.

Distinctive features of many quick freezing installations are the factory where cleaning, splitting, skinning (if fish), and trimming, sorting, grading (if fruit) are carried out before the food product is actually frozen. When the food products are prepared and packed into special cartons or wrappings, which of necessity must be moisture-proof, the cartons are placed on trays which are placed on the conveyor belts.

Times of freezing depend on the thickness of the food product and the temperature of the cooling medium. As a general rule, estimated freezing times approximate as follows: ¾ in. thick, 25 min.; 1 in. thick, 55 min.; and 1¼ in. thick, 100 min.

Such phenomena as shrinkage, drying out, discoloration, etc., require special consideration. If there is no fault with the actual freezing, these are usually due to causes connected with cartoning and wrapping, and more often to defective pretreatment during preparation for freezing.

There must be a correct interpretation of the optimum conditions governing each particular food product in order to assess the peculiarities which may afford distinct contrasts under the quick freezing process.

The reasons why lower temperatures both for actual quick freezing and for later storage are necessary for certain products are that food products tend to form differences in their ice crystallisation according to their water content.

Distribution and Storage

The success and popularity of quick freezing depend greatly on packaging and distribution. Without efficient distributive methods successful quick freezing would be of little avail. Efficient packaging, transport, and storage in both wholesale and retail warehouses are essential.

Food products in storage are always liable to damage and deterioration. Fluctuating temperatures and high humidity content promote desiccation and oxidation. Slow frozen products in cold storage are considerably affected by the humidity in the air currents formed by the meeting of the hot air admitted through the doorway with the cold air of the chamber every time the door is opened. At the ordinary storage temperature of 15° F. the difference between the critical temperature of most food products at 18° F. is not very great. Mould germination begins, and the continuous passage of moisture promotes enzymic action, which tends to increase with considerable rapidity.

Quick frozen products are more effectively sealed against these deteriorating actions, and the difference between quick and slow frozen products is very apparent after a period of three or four months' storage.

Containers

Considerable care in avoiding temperature fluctuations must be taken when quick frozen products leave the store for retail distribution. Where the

(*Continued on page* 397)

Insect Pests in Stored Foodstuffs

WALTER S. DAVID

The science of insect control, involving research into their life story, their habits, and practical experiments with insecticides and other means, enables us now to exclude or reduce considerably the frequent very heavy losses due to infestation.

THERE are first of all preventive measures to be considered. These are mainly concerned with general storage hygiene, destined to keep the number of insects present at the lowest possible level. Regular inspection, frequent movement, separating healthy and contaminated goods from one another, and, above all, thorough cleanliness are the most important factors of this kind of pest control.

Other measures, either physical or chemical, have for their purpose the elimination of the heavy infestation which has occurred during the different stages of transport and storage, but care must be taken to ensure that the means employed will not detrimentally influence the quality of the foodstuffs concerned and whether the treatment will not be too costly with regard to their value.

In most cases, however, the routine treatment of frequently infested goods—be it the raw material or the finished product—has proved to be of immense economic value.

Hot-Air Chambers

For certain commodities the use of heat in specially designed chambers is advantageous. Heat may, however, unduly reduce the moisture content, it may influence the germination power in case of seeds, and it may also reduce the weight of the goods. Another difficulty is that heat reaches the centre of bulked material very slowly.

For a quantity of foodstuffs, however, and in case of many insects, this is an excellent measure of control, and food manufacturers should investigate its possibilities.

Chambers may be constructed of bricks or concrete in combination with some heat-insulating material. A thermometer, glass windows, and heat-insulated doors should be incorporated and the heating system regulated from outside. It may be advisable to install a hot-steam valve in the ceiling in order to increase the atmospheric water content, thus reducing the loss of moisture in very sensitive commodities.

A Continental food manufacturer, using hot-air chambers with complete success, had their walls simply constructed of thick plates of asbestos, protected against mechanical damage by sheet metal. This firm was mainly processing the more expensive class of dried fruits and nuts.

Hot air has proved successful in the treatment of raisins, dates, figs, apricots, prunes, and many other dried fruits against the Indian meal moth (*Plodia interpunctella*), the dried fruit beetle (*Carpophilus hemipterus*), the fig moth (*Ephestia cautella*), and other pests, including mites, all of which will multiply rapidly and devour and destroy valuable commodities.

The goods may not necessarily be spread out on shelves, but it must be considered that some foodstuffs cannot without damage endure more than 140° F., while the heat in chambers may have to be much higher to reach the centre of a box or a bag. Bernfuss[1] when treating prunes with moist heat did not even remove the box unless infestation was severe. Small quantities of dried beans, peas, lentils, grains, and similar goods, if not intended as seeds, and even small quantities of flour, have been submitted to heat treatment with success.

In our climate it will be too costly to provide so many radiators in mills or factories to increase the temperature to the desired height in order to disinfect equipment and rooms, unless specially designed oil-heated stoves are used. Superheated steam would be the economic way, and is frequently used for vermin control on ships. It may be employed for the disinfestation of empty storerooms, provided the moisture will not damage equipment and structures.

Recently, success is said to have been achieved by another method, in which the goods concerned were moved on conveyor belts while cold and quickly following hot air is repeatedly blown at them.[2]

Warehouse Fumigation

Insecticidal poisons still hold first rank in pest control. Those insecticides which are applied as a vapour or a gas are the most effective ones, due to their property to diffuse and to fill any space into which they are introduced. They must be penetrative and reach the pest wherever it breeds. Even the centre of a bag of flour, the inside of a grain or a prune must be reached without damaging the commodity.

The gassing of entire warehouses filled with foodstuffs is fraught with many difficulties and should in general be carried out by experienced staff. Only ethylene dichloride in mixture with carbon tetrachloride can be used for warehouse fumigation

without many complications and hazards. During the process the air should be stirred and all openings should be sealed with paper, one side being covered with a layer of vaseline. A paste of flour and oil may be used for sliding doors or other openings which are difficult to seal.

For sterilisation of equipment and empty warehouses the sulphur dioxide gas can be employed with little risk, provided precautions are taken that the burning sulphur does not cause a fire. Goods, except dried fruit, may be tainted by these gases, and metals should be protected against the corrosive fumes by a greasy film. In the case of a mite-infested room the walls, floors, and equipment should have an additional sal ammoniac wash.

Fumigation can also be carried out in barges, refrigerator trucks, railroad cars, under gas-tight tents, under tarpaulins, and under wooden barrels or steel drums by inverting them over the goods to be treated.

The Baby Box

Of considerable practical value to the food trade are specially designed enclosures ranging from the primitive baby box to the intricate vacuum and circulation chambers. Such enclosures offer great advantages because of their fixed characteristics. The saving of fumigants alone, due to elimination of leakage and dead space, will soon balance the initial expense of construction.

The most simple kind of fumigation chamber is the mobile baby box, which may be made of sheet metal or plywood as long as it can be hermetically sealed.[3] The process of pouring the fumigant into the box, which is previously filled with infested goods, and the sealing as well as the airing after fumigation can take place in the open air or near a large window to avoid inhalation of heavy gas concentrations.

The lid, provided with felt or soft rubber taping, should be pressed against the box by a heavy weight or hand-screws. The construction of the box can also be made so that an oil-flour paste, a liquid, or any greasy or gelatinous colloid can be easily applied to the joint of lid and box to secure a seal.

Small fumigation chambers of this kind may do excellent service in many branches of food-handling establishments.

The Vacuum Chamber

Those enterprises which handle daily vast amounts of foodstuffs that are liable to infestation use vacuum chambers, which make the treatment possible in a minimum of time.[4] Research has shown that the vacuum will not greatly increase the penetration of the gas into the merchandise as it was widely supposed, but that it reduces the oxygen content of the atmosphere and thus accelerates the lethal action.

A vacuum chamber should be made of mild steel; it should have a heating system, a device for the quick vaporisation of the fumigant, and means to procure a movement of the gas inside the chamber. A powerful exhaust should quickly empty the vault of gases.

All chambers which have the purpose of ridding goods of pests should be provided with doors that can be handled by one man, and the entrance to the chamber should be wide enough to enable quick loading and unloading with the means of transport available at the particular concern.

The Atmospheric Chamber

Fumigation vaults need by no means be expensive. Within the reach of even small concerns is, for instance, the atmospheric chamber, a very simple construction and of great value now that there are highly penetrative fumigants on the market. Its handling is easy, its action efficient, and in case of urgency the fumigant administered could be increased to reduce time of fumigation. Also, two or more chambers could be installed and the time factor thus eliminated.

Any building material that provides a good seal can be used for this purpose. A brick or concrete wall, covered with three coats of asphaltum paint or carefully lined with roofing felt, would fulfil its purpose. The application of a layer of a bituminous compound (available at builders' merchants), such as is used to waterproof balconies and damp foundation walls, has an excellent sealing effect. The bitumen is applied to ceiling, floor, and walls about one-eighth of an inch thick and then sprayed with coarse sand. When dry it is covered with a dense rendering of concrete and coated with oil-paint. A chamber of this kind could be built in the corner of a room, thus reducing the expense by using existing walls.

This vault could also be constructed of plywood, mounted on the inside of a strong timber framework, and be sealed with the aid of strips of roofing felt and ample asphaltum paint. The floor could be of dense concrete or ordinary timber covered with asphalt flooring to protect it against wear.

Two electric fans should be provided, one to stir the air, the other one leading through an opening to the fresh air above an adjacent window to extract the gases from the chamber after fumigation. A trap door must hermetically close this exhaust during the gassing process. The entrance door should be hinged at the top and so counterbalanced that it can easily be handled and kept out of the way when loading is in progress. When the exhaust is being worked this door should be kept slightly open to let fresh air enter the chamber. The installation of a heating system is advised.

It is necessary, periodically, to find out whether an atmospheric chamber is still airtight. A simple

method, recommended by Mark and Long,[5] is to burn sulphur inside the chamber. A rag soaked in ammonium hydroxide is then moved along the exterior face, especially at all critical spots like joints, doors, and along the floor. If there is a leak, heavy white fumes of ammonium sulphite will develop.

The Fumigant

What provisions will have to be made for introduction of the gas into the chambers depend on the particular chemical in use. In case of fumigants that are supplied in containers under pressure, like ethylene oxide/carbon dioxide or methyl bromide, the fumigant container is placed outside the chamber on a platform-balance from where a copper tubing with a spray nozzle at the end leads through the roof into the chamber. The necessary quantity is weighed, and the operator does not need to wear a respirator as he does not come into direct contact with the gas.

In case of other fumigants like chloropicrin, ethylene dichloride, or carbon tetrachloride, if they cannot be pumped into the chamber through the nozzle, a special door should be provided in the roof to place flat dishes containing the liquid on top of the goods. It is advised that these less volatile gases should be evaporated in a hot-water bath to accelerate the process of fumigation. Ethylene dichloride or ethylene trichloride is suitable for the baby box.

Protection of Clean Goods

Goods that have been disinfected must be most carefully isolated and protected against further infestation. The placing of fumigation chambers, hot-air chambers, and similar devices should therefore be well planned, and pests must be denied access to rooms where the treated goods will be stored, packed, or processed. One way of doing this is to raise doors by one step and to fix fly paper or a sticky compound all around the entrance. A fan installed over the entrance and operating while the door is open will prevent insect pests from passing through it. An automatic door-closing device is also recommended. Holes in walls, through which pipes may be led and which cannot be completely closed, may be sealed with a grease of high melting point containing some carbolic acid.

Chambers can have two openings, one for loading, the other one leading directly into the adjoining room, thus excluding the use of doors. Roofed fumigation chambers can also be built in the open air away from warehouse and factory.

The Protective Film Method

We have to thank the British scientist C. Potter for the introduction of the protective film technique, which is mainly devised to stop the spread of infestation in warehouses and prevent reinfestation.[6] Practice has shown that this method of application of insecticides is a most valuable and simple aid in the fight against a number of pests so disastrous to many foodstuffs.

Boxes, bags, and all exposed surfaces of the warehouse are sprayed regularly with pyrethrum or thiocyanate insecticides by means of an atomising gun. The most important pests occurring in warehouses have been susceptible to this treatment, particularly the Indian meal moth (*Plodia interpunctella*) and the cocoa moth (*Ephestia elutella*).

A most interesting development is the dispersion of insecticides in extremely fine particles by a method that produces aerocolloids or aerosols.[7] Recent research has shown that the insecticidal droplets produced are much smaller than those originated by the ordinary spray method. They float longer in the air, and the deposited film on goods and other surfaces is more finely divided and more toxic.

Other Methods of Control

A good counter-measure is, according to Zacher,[8] the admixture of anilin oil in the distemper when whitewashing walls. One litre of anilin oil is dissolved in 10 lb. of water, care being taken that the room thus treated is not entered until the walls are dry, the vapours evolved being highly poisonous.

Pentachlorphenol has been used as the basis of an effective insecticidal wood preservative. It is applied to wood structures inside buildings, and has a long lasting lethal effect on many species of insects.[9] As an example, heavily infested stables will be kept clear from fly pests for at least three months without endangering livestock.

Much has been said about DDT, but research has not advanced far enough to say anything definite with regard to preservation of food stocks. It is very effective against flour beetle, rice weevil, and German and American cockroach. But can this chemical be used with safety in food-handling establishments? There is no scientific proof yet that DDT is not poisonous to human beings. Its main advantage is its high degree of residual toxicity.[10]

The admixture of dust to cereal and other foodstuffs, thus killing insects by moisture extraction, is well known. A new kind of dust has recently been discovered, which is said to be more effective, insoluble in water, and non-poisonous.[11] It is claimed that grain dusted with this new product is scarcely distinguishable from other grain.

Some foodstuffs may be freed from insects by immersion for a few seconds in boiling water; others, like flour, may be strained over fine cloth.

A new method is being used to submit goods to ultra-violet rays, running them on slow-moving conveyor belts under a battery of lamps. Specially devised centrifuges are being used to rid cereals of

insects. However, such treatment cannot affect pests which are harbouring inside grain.

There are many more suggestions for insect control. The patent literature provides an abundance of new ideas, of which quite a number may be called impracticable or even Utopian. Only those measures that are of immediate interest to the food industry have been mentioned here, and it is hoped that they will be more widely applied.

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Export of Cocoa Products and Sugar Confectionery

THE United Kingdom has accepted responsibility for the supply to certain British Colonies, Iceland, and the Faroes, and to some Middle Eastern Countries of limited quantities of certain commodities. These territories are known as programmed markets. The securing of orders from these markets, within the limits of their programmes, is left to free competition and licences for the export of any of the commodities mentioned to these markets will be freely granted provided that the application is supported by an import licence issued by the country of destination (in cases in which import licences are required) and that the programme for the commodity in question has not already been exceeded. It must be remembered that many of these programmes have already been largely implemented. Markets other than the programmed markets mentioned above are known as unprogrammed markets.

Cocoa Powder.—Early this year the Ministry of Food gave approval for the export of a limited quantity of cocoa powder. This quantity was divided between manufacturers of cocoa powder and exporters, and a bulk licence was issued to each of these firms to cover the export of its quota at any time during 1946 to any destination except Iceland and the Faroes, for which countries special arrangements were made. It is improbable that approval will be given for the export of any additional cocoa powder to unprogrammed markets during 1946.

In addition to the above, programmed markets for cocoa powder for 1946 are Aden, British Guiana, British Honduras, Burma, Cyprus, Gibraltar, India, Hong Kong, Kenya/Uganda, Malta, Mauritius, Nigeria, Sierra Leone, Sudan, and Syria.

Cocoa Butter.—By international agreement cocoa butter may only be exported if the country of destination is prepared to surrender an equivalent quantity of cocoa beans from its allocation by the Combined Food Board in favour of the country making the export. The agreed rate is 100 tons of cocoa beans for every 40 tons of cocoa butter. It follows that cocoa butter can only be exported from the U.K. to a country having a cocoa bean allocation (UNRRA counts as a country in this respect).

When, therefore, an application for a licence to export cocoa butter is received by the Export Licensing Branch of the Board of Trade it is referred to the Ministry of Food. The Ministry then ascertains whether the government of the country is willing to surrender the appropriate quantity of beans and (since the Ministry has to buy them) whether they are of a type and at a price acceptable to the Ministry. Applications for an export licence should only be made when the country of destination has issued the necessary import licence (except in cases in which import licences are unnecessary) and the number of the import licence must be quoted on the application. It will be observed that some considerable time must usually elapse between the submission of an application and the decision as to whether it can be granted or not.

The cocoa beans used in the manufacture of cocoa butter which is exported are replaced by the Ministry. It follows that it is unwise for manufacturers of cocoa butter to enter into definite commitments in respect of supplies of cocoa butter for export until they have ascertained from the Cocoa and Coffee Division, Ministry of Food, 49, Portman Square, London, W.1, the price at which the beans will be replaced.

Subject to the conditions set out above there is no restriction on the export of cocoa butter either as regards quantity or destination.

Cocoa Cake.—A licence for the export of cocoa cake to any destination will usually be freely granted provided that the cocoa butter content does not exceed 2 per cent.

In certain instances permission is given for the export of cocoa cake containing more than 2 per

cent. of cocoa butter for the purpose of the extraction of the cocoa butter and the return of the cocoa butter so extracted to the United Kingdom. Applications for licences under this heading should state the cocoa butter content of the cocoa cake which it is desired to export and the amount of cocoa butter which the exporter expects to receive when it has been extracted.

Chocolate and Chocolate Confectionery (other than Medicated Confectionery).—No export is at present permitted to unprogrammed markets. Programmed markets are Ascension and St. Helena, British Honduras, Burma, Ceylon, Cyprus, Egypt, Falklands, Faroes, Hong Kong, Iraq, Kenya/Uganda, Lebanon, Malaya, Nigeria, Saudi Arabia, Sudan, Tanganyika, and Trinidad.

Sugar Confectionery (other than Medicated Confectionery).—No export is at present permitted to unprogrammed markets. Programmed markets are British Guiana, Burma, Cyprus, Egypt, Falkland Islands, Faroes, Iraq, Kenya/Uganda, Lebanon, Malaya, Nigeria, Saudi Arabia, Sierra Leone, Sudan, Tanganyika, and Trinidad.

Sugar confectionery includes chewing gum and peppermint.

Medicated Confectionery.—There is no restriction on the export of medicated confectionery either as regards quantity or destination. Export licences are not required for medicated sweets, but allocated materials used in the manufacture of medicated confectionery for export are not replaced.

Chocolate Couverture.—For the pupose of export sweetened chocolate couverture is treated as chocolate (see above).

Unsweetened chocolate couverture is treated in the same way as cocoa butter (see above) except that 100 tons of beans must be surrendered for every 80 tons of unsweetened couverture exported.

Price Control.—Attention is drawn to The Exports (Relaxation of Price Control) Order, 1946 (S.R. & O. No. 660). Copies of this Order are obtainable from H.M. Stationery Office or from any bookseller.

Drawback.—Claims for drawback, in respect of exported commodities containing dutiable ingredients, are met by customs and excise, but in the case of goods exported on behalf of UNRRA claims for drawback should be addressed to the Ministry of Food together with evidence of shipment supplied by Customs and Excise.

A Physiological Factor in Food Metabolism*

In their first paper (1942*a*), McCance and coworker found a negative Ca balance under brown, after a period of white bread intake; in their second (1942*b*), a decreased absorption. They blamed phytic acid for this unwarrantably. The ions and molecules of the body remain constant within narrow limits. Absorption of Ca depends also on availability of other substances which compete with each other for the limited space in tissues and blood. Phosphorus, in particular, stands in reciprocal relation to Ca. Phosphorus and other substances are present in much larger quantities in brown bread. Apparently part of Ca in the body is replaced by phosphorus and some excreted into the bowels, giving rise to a negative balance. We carried out the following experiment: A subject was kept on a constant Ca intake and a constant diet for one period. In a second period, under the same Ca intake and diet, phosphorus and other substances were added. First period of Ca output 78 per cent. of intake. First three days of second period 160 per cent.; ultimately Ca 133 per cent. In the dephytinised bread there has been so much interference that many new factors come into play, and the experiments, therefore, prove nothing.

The balance experiments of McCance were not carried out long enough. It is clear from our experiments that urinary volume and urinary Ca are raised—a fact incompatible with a mere decreased absorption. Large numbers of people have eaten brown bread all their lives without showing Ca deficiency, which is incompatible with a permanent negative balance (see Harris, 1942).

* I. Harris and C. E. Vernon (introduced by H. E. Roaf) from the Proceedings of the Physiological Society, October 2, 1943, *Journal Physiology*, Vol. 102.

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		White Bread Period 14 Days.	*National Wheatmeal Bread without Added Ca.*				
			1st Week.	*2nd Week.*	*3rd Week.*	*4th Week.*	*Last 3 Days.*
U	Vol. in c.c.	835	1,179	1,327	1,607	1,598	1,735
	Ca	32·0	31·5	35·0	37·3	34·4	42·6
Ca in U + F	... ...	89·5	128·7	155·6	139·5	118·5	114·3

Figures are daily averages and Ca is per cent. output in relation to intake. Experiment continues.

Calcium in Bread

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—The story of the adulteration of our bread with a slow-acting poison is an amazing one. Originally the scheme applied to white bread, which does not contain phytic acid, and not to brown bread. In the first place, the idea underlying the proposal was to prevent brittleness of bones among the adult population. The authority concerned was challenged to produce one dozen cases of calcium deficiency in adults—and was unable to do so. The outcry against the proposal was such that it had to be dropped. But as the Food Minister failed to act on the suggestion, the phytic acid bogey was resurrected, when it was maintained that only brown bread needed fortifying and not white. But an American Commission as far back as 1937 had come to the conclusion that there is nothing in the phytic acid theory. It was virtually admitted by the workers on behalf of the Medical Research Council after the scheme was already in force that there was no valid reason for the proposal. A more damning admission it is difficult to imagine—to force forty million human beings to consume extra doses of so potent a substance as calcium, without solid reason for doing so, is surely an amazing procedure!

Worse still, it has been admitted that the phytic acid in flour disappears on baking; and as people in this country eat their bread baked the need for the fortified loaf, according to the sponsors of the scheme, obviously does not exist.

The matter is of the utmost gravity, because it has been proved conclusively that calcium raises the blood pressure, and that unfortunately the number of people suffering from high blood pressure is increasing by leaps and bounds, and this bread is certain to shorten the lives of many people. There is not the slightest doubt that the whole phytic acid business is the result of a blunder. It will be seen from the enclosed report* of the proceedings of the Physiological Society that the whole business was based on a misconception; and, incidentally, this report was published on a vote actually taken by the Physiological Society, which is the highest scientific authority in this country. For a general review of the subject I refer your readers to my pamphlet *The Calcium Bread Scandal.* Since then we have done a considerable amount of experimental work which has established beyond doubt that there is nothing whatever in the phytic acid theory and also that calcium causes a rise of blood pressure. These experiments are reported in our book *Studies in Hypertony.*

The only thing to be done is for all concerned in the matter—food manufacturers as well as the general public—to initiate and sponsor an enquiry by the greatest experts of the country. The enquiry must be an open one. I believe that there will be found men of the highest standing here who have sufficient integrity not to be cowed or influenced by the Medical Research Council. In any case, there is America, where its influence has not penetrated.

I am quite sure that food manufacturers who are putting calcium in the flour are committing an act against the people's health, and my suggestion to them is to insist upon a pronouncement on the subject from an authoritative and independent body.

The fact that innumerable generations in different countries in the past depended for their staple food on undoctored brown bread and survived in itself makes the whole phytic acid business ridiculous.

Yours, etc.,
I. HARRIS.

Liverpool.

* This is printed on page 395.

Quick Frozen Fruits

TO THE EDITOR OF FOOD MANUFACTURE

DEAR SIR,—The ways of our Government, or, as Mr. Bevan prefers to describe himself and colleagues, "our masters," are strange and difficult to understand.

Last year when the crops of such generally desirable fruits as strawberries, raspberries, loganberries, etc., were comparatively poor, the quick freezing of these fruits on a limited scale was permitted by the Ministry of Food, and the result of this was that many people in the dark months of winter enjoyed these fruits in their quick frozen form. This year, however, in spite of the fact that the crops are much greater, the total tonnage of soft fruit greatly increased, and in addition our own home-grown supplies are reinforced by imports by the Ministry of Food from Holland, Belgium, Italy, and France, both in the fresh state and in the form of pulp for jam making, the Ministry of Food has decided that the quick freezing of soft fruit cannot be permitted, the underlying suggestion being that it is necessary to earmark sufficient soft fruit to maintain the jam ration.

I have nothing to say against earmarking sufficient fruit to maintain the jam ration, although there is some considerable doubt in my mind as to whether jam rationing as such continues to be necessary, and as we make jam ourselves I can look at the thing without bias, but as there was sufficient fruit last year to keep the country going with jam, and at the same time allow some for quick freezing, it is difficult to understand why this new restriction had to be imposed this year, when the availability of soft fruit is much greater.

Some may be under the impression that quick

frozen fruits are a luxury, but another luxury, in the form of a 2s. 4d. packet of cigarettes, is consumed by the million daily. Frozen fruits scarcely cost any more, and they at least do not go up in smoke! It would, on the other hand, provide a touch of brightness in the diet, which is at present so deadly dull.

Our friends in America went ahead like wild fire—quick freezing every imaginable kind of foodstuff during the war, and this was encouraged by the Government, particularly during the tinplate shortage, as it naturally saved metal.

Manufacturers are encouraged by word of mouth to increase their production. We put up several completely new quick freezing plants of the very latest design this last winter, and were then precluded from using them to the fullest extent by being unable to freeze soft fruits. Words alone, unless they are followed by actions, in this sphere of work as in others, don't produce much in the way of a tangible result.

Yours faithfully,
W. V. SMEDLEY.

Wisbech.

Metal Containers for Cured Herring

A NEW experiment in the use of metal containers instead of the traditional barrels in the process of herring curing has been reported from the Torry Research Station. A glazed enamelled vat is being used, and various types of packs are being carried out to investigate keeping quality. Among these variations are herring gutted and gilled but with heads, herring gutted, gilled, and beheaded, while other vats have been filled with the whole herring, with no part removed. These various packs will be held against a control pack treated in the present manner. When cured the fish will then be packed in tin containers, holding between 30 and 40 herring each, which will then be held in turn for check against later consumption and analysis.

These moves are dictated by several factors. The first is an undoubted change in marketing technique dictated by the political and other considerations now prevalent on the Continent. It is not regarded as likely that large bulk containers of herring will be marketed post-war, but that a smaller type of pack may become popular, in the type indicated, of from 30 to 40 herring. The second factor may be the lack of wood, which threatens to continue for some time ahead. If metal vats can be demonstrated to be as efficient as wood they can be produced much more cheaply and with greater speed in present conditions than skilled coopers can produce barrels, assuming that both coopers and barrel timber were available.

The third factor involved is the extent of preparation necessary in the handling of the fish. If these experiments show that whole fish will survive successfully, there can be a very definite saving effected in the time required for handling at the catching end.

Quick Frozen Foods

(*Continued from page* 390)

transit is of short duration the question of temperature is not so important, but occasionally the distance covered may be great and the product carried by road, rail, and sea, and consequently the container in which the products are packed will be subjected to various temperatures and humidities.

It follows, therefore, that the packages in which the food product is contained and the container in which the packages are placed for transport must be of special construction so that no matter what climatic conditions may exist outside the container the inside of the container preserves ideal storage conditions.

All the most efficient and successful quick freezing methods will prove useless if thawing is allowed before the product reaches the consumer.

One of the most successful containers is made from corrugated fibreboards with different liners. It makes an ideal insulant and combines strength without weight. Used in conjunction with dry-ice such containers can travel for three to four days with apparent safety.

The choice of a package for the food product must be consistent with the requirements of automatic machinery. In practice it has been found that the rectangular shape is the best. The material must of necessity be moisture-proof cardboard.

In the ordinary retail shop quick frozen products must be sold in a perfectly frozen condition and for this reason can only be sold from a storage cabinet. Because of the lower temperature range the storage cabinet for quick frozen products differs from the usual refrigerated cabinet or counter. The insulation is heavier, the refrigerating plant is greater, the allowance for heat losses through door opening and so on must be more, and special precautions against window frosting must be taken.

Plans for post-war development of this new industry are mature. The covering of the country with distributive centres which will be fed from various quick freezing factories has been outlined, and every known form of food will eventually be available in quick frozen form. The availability of seasonable foods during out-of-season periods will soon be firmly established.

The Dissemination of Scientific Information

THE practical application of new knowledge depends largely upon its proper assembly, publication, flow to those interested or to whom it may concern, and integration with existing knowledge in industry. This process does not occur of itself and needs to be organised not only within each separate industrial concern, but also for each industry as a whole.

In connexion with the recent Royal Society Empire Scientific Conference, the F.B.I. Industrial Research Secretariat has prepared a memorandum on "The Dissemination of Scientific and Technical Information to Industry in the United Kingdom and the British Commonwealth." The memorandum states that the primary sources of new scientific knowledge are the reports and papers which emanate from laboratories of all kinds investigating material phenomena, either fundamentally or as specific problems referred for solution. As a result of these researches a very considerable stream of information is disseminated, either broadcast or to the particular "reception centre" for which the investigation in question was carried out.

Moreover it must not be forgotten that within every industrial establishment working data accumulate in the process of production and as one of the results of applying experience to operating problems. To the extent that these are assembled and correlated into organised information, they form complementary sources of new knowledge which can be employed with the primary sources as a basis for industrial advance.

The chain between the dissemination of new knowledge and its application may be long, but each link in the chain involves the supply and absorption of information. The efficiency and accuracy of transmission is therefore of the greatest importance, and there is need for special care if results are submitted in summarised or abstracted form. Two situations broadly differing must be recognised:

> (*a*) That of the industrial concern steadily absorbing information of interest emanating as current publications from originating and abstracting sources.
>
> (*b*) That of special information required from time to time, often urgently at a moment of crisis, when trouble arises, or before a new process, product, or raw material is to be introduced into the works.

It is essential that any seeker after information be provided without delay with the best references, or be made aware of the information service best abie to cater for his particular problem. Here the function known as "special librarianship" or "technical documentation" including the organisation of indexes is of great importance in order that information may be held "in instant readiness" for action when required.

In Great Britain there is no organisation covering comprehensively this whole field of scientific and technical information. Moreover there are many thousands of technical and scientific publications, journals, abstracts, and bibliographies. These are for the most part not co-ordinated and frequently overlap one another. There is room for much improvement and rationalisation here, particularly in the sphere of engineering. There would appear to be scope for a comprehensive national technical information service, linking in a loose way the various existing organisations, and providing recognised machinery for putting enquirers in touch speedily with the body that can best help them.

German Patents

DELEGATES from Australia, Belgium, Canada, Czechoslovakia, Denmark, France, Luxembourg, Netherlands, Norway, Union of South Africa, United Kingdom, and the United States of America attended a conference to consider the question of the future treatment of German-owned patents in Allied countries which took place in London from July 15 to 27.

The chairman of the conference was Sir Harold Saunders, the Comptroller of Patents in the United Kingdom.

Patents taken out by Germans exist in varying numbers in all countries of the world. Complete unanimity prevails among the Allied nations that in no circumstances shall any such patents within their territories revert to the former German owners, and the question as to how such rights shall in future be disposed of presents many difficulties. A strong sentiment prevails that it would be unfortunate if the continued existence of these patents should constitute an obstacle to international trade.

As a result of the discussions at the conference, the representatives of France, the Netherlands, the United Kingdom, and the United States of America have signed an accord which will have the effect of making all patents of former German ownership now controlled by their Governments, and in which there is no non-German ownership now controlled by their Governments, and in which there is no non-German interest existing on August 1, 1946, available within their respective territories to all nationals of the countries party to the accord without payment of royalties or without any requirement to manufacture within the country where the patents exist. The representatives of Australia, Canada, Czechoslovakia, and the Union of South

Africa have agreed to recommend to their respective Governments that the accord should also be signed on behalf of those Governments.

Representatives of Belgium, Denmark, Norway, and Luxembourg feel that the special difficulties which exist in their countries render it necessary for their Governments to give a more detailed and closer examination of the provisions of the accord before coming to a decision as to their policy.

As stated above, the accord has been signed by four countries, and it remains open for signature by other members of the United Nations and by neutral countries until January 1, 1947. It will come into force as soon as it has been signed by three further countries provided they sign before the end of 1946.

Milk in North America

WITH the object of finding out whether there were new and improved methods and better practices overseas which could be applied to stimulate still further our own developing dairy industry, the Government sent a small mission to the United States and Canada in the spring of 1945, and their findings are incorporated in a recently published report.*

The outstanding feature, brought out clearly in the report, is the fact that milk is produced mainly on the comparatively small farms handled by the farmer and his family. The family farm can be said to be the chief milk-producing unit, both in the United States and in Canada. The types of farms are described in some detail, but, broadly speaking, the great majority have a small herd of cows consisting of from fifteen to thirty. The acreage of the holding did not generally exceed 160, and the important fact was that most of the work on the holding was undertaken by the farmer himself, with his wife and family and an occasional hired man.

It is evident that American and Canadian conditions, while differing in many features from ours, are similar in essentials, and it is the Mission's belief that some of the practices that are current in these countries can be applied with profit over here. On the marketing side the Mission say that there is no organisation, either in Canada or in America, which seems to be so well run and effective as our own producers' Milk Marketing Boards in this country.

Detailing recommendations for adoption in this country, the Mission point out that the cows used for milk production in America are almost exclusively of the single-purpose type. They estimate that yields are higher on average than in this country, and they recommend that the Ministry of Agriculture should review carefully cattle-breeding policy in England and Wales in order to promote more rapidly the establishment of single-purpose dairy breeds on our farms where milk production is a main enterprise. The Mission believe that on these lines the efficiency of our own milk production industry can be improved, high output per cow being essential for high output per man engaged in the industry.

It is clear that the methods used for feeding dairy cows in America are very different from ours —not perhaps so different now as before the war. Throughout the long winter months the cows are fed on home-grown foods, mainly lucerne hay, cereals grown on the holding, maize, and silage.

Other important recommendations refer to improvements in milk recording, the eradication of tuberculosis from our dairy herds as soon as this is practicable, and the supply of electricity to our dairy farms.

On the quality side the Mission describe in some detail the method used both in the United States and in Canada for payment of bonus to producers on the basis of the butterfat content of the milk. This practice seemed to be universal, and the Mission recommend that, in order to improve the compositional quality of milk in this country, steps should be taken to pay better prices to those producers who market milk of high quality.

Dealing with the manufacture and sale of fresh cream and ice cream in this country when supplies of milk are available, the Mission studied the subject in all its aspects in the United States and found that ice cream on the American continent is almost exclusively a dairy product. Both ice cream and fresh cream are subject to legal standards, with which the manufacturers and distributors must comply. It is recommended that similar steps be taken in this country before the trade is opened again for fresh cream.

The report does not say that in the milk industry of this country we are very far behind the United States and Canada. In some features—notably on the marketing side—we are ahead, but in matters of farm technique we have something to learn, and the Mission believe that, without being critical of our own dairy farms, they can be improved in many ways by application, in some measure, of American and Canadian methods.—T. C.-W.

* *Milk in North America.* Agriculture Overseas Report No. 1, pp. 64. H.M.S.O. 1s. 3d. net.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Flame Spraying in the Food Industry

ELIMINATION OF SOLVENTS

A standard method of protecting sheet metal work against atmospheric or chemical attack is to paint or spray with a lacquer or varnish. Many of these coatings nowadays are very good, but most of them are extremely thin, primarily because any attempt to apply a very thick coating involves major difficulties in eliminating the solvent from the lacquer or varnish. Moreover, such coatings, because they are carried by a solvent, fail in protective value when used in contact with materials themselves containing solvents.

This problem has been tackled by the Schori Metallising Process, Ltd., along the lines of protecting food vessels by flame spraying. Various selected plastic materials are first of all produced in a powdered condition and are then blown by compressed air through a pistol from the nozzle of which is burning an oxy-gas flame. The momentary passage of the plastic through the hot flame fuses the plastic which then adheres to the surface which is being treated in a relatively thick coating. Compared with coatings applied by a paint spray pistol in which the lacquer or varnish is carried by a solvent, the flame-sprayed coatings are much thicker because there is no solvent to evaporate out, and because they are not applied in a highly fluid condition.

Polythene, for example, can be sprayed on sheet steel vessels (which were formerly galvanised) for containers, pasteurising equipment, cleaning solutions, tanks, etc., or settling tanks, valve bodies, pulp pits, etc., for a sugar factory, on to cider storage tanks operated under pressure, on to soda water vats and syrup pans, and particularly in connexion with milk bottling machines and equipment.

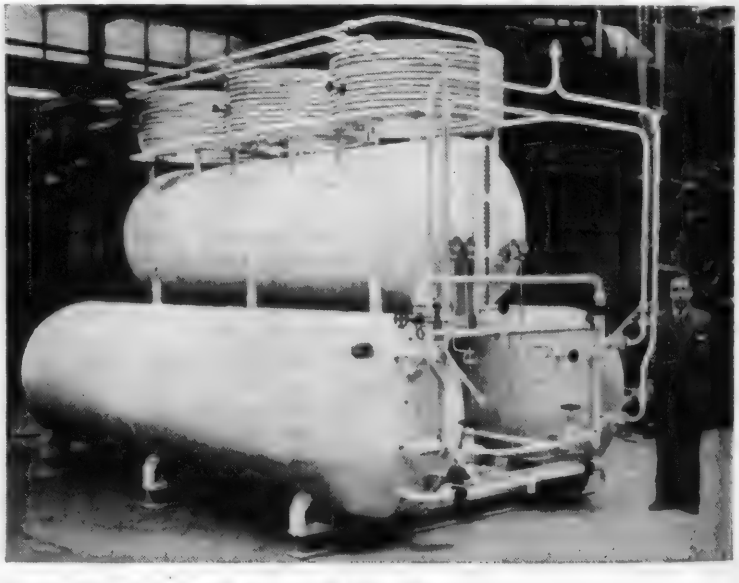
Various waxes, both natural and synthetic, are also coming into prominence as protective coating materials in the food industries when applied by flame spraying. Wax is particularly suited to the treatment of concrete, since the flame application drives the wax right into the pores. Wax coatings have been applied by this process to vats for wine storage and also for water-proofing.

For certain selected conditions shellac has many admirable applications in food vessels. Here, again, instead of carrying the shellac in a solvent and thus producing a very thin coating, the flame-spraying process puts on to the surface being treated a very thick fused film. Shellac applied by this method can be blended with various fillers to modify the physical properties of the coating, and to a limited extent it can also be pigmented. Such shellac coatings were recently applied to large concrete chambers to be used for the storage of various vegetable oils.

Food processing companies have to concern themselves not only with the plant and equipment but also with the interior walls of the factories themselves. A very old material which has been newly applied by the flame-spraying method is sulphur. Sulphur has many admirable qualities which recommend it to food processors, for not only is it practically insoluble in all known solvents (and thereby a water-proofing substance) but it can be pigmented to a variety of pastel shades, is flexible in thin coatings, and to a certain extent acts as a fungicide.

Flame spraying enables very much thicker coatings of metal to be applied than can be put on by electro-plating or hot dipping. Coatings of twenty-thousandths of an inch up to one-eighth of an inch, for example, can be applied by this process in tin or zinc, which would be quite impossible by hot dipping or galvanising.

Tin spraying is, however, the most generally used of all the flame-applied coatings in the food industries for both steel and copper vessels, and quite thick coatings can be applied in this way. In general, the first expense is high, but here again the operation must be costed over a number of years. In many cases a tin-sprayed steel vessel is much cheaper than one fabricated in solid tin or stainless steel. A very large amount of tin spraying is being undertaken, especially in connexion with the food industries, and recent jobs completed include the treatment of steel containers for sweet manufacture, jam boilers and mixers, mincemeat bowls, dough bowls, toffee mixers, wheat elevators and hoppers, almond mincing machines, milk churns, brewing equipment, and all types of copper containers, mixers, boilers, and so on.



Refrigerating machinery sprayed by Schori process.

The Factory in a Garden

Since 1941 vegetables grown in the grounds of Cadbury's factory at Bournville have been supplied to the works' canteen where some 4,500 employees have their daily midday meal.

Large quantities of wheat grown by this "factory in a garden," as it is so often called, have been sold to the firm which provides flour for the Bournville biscuit plant. Some Bournville chocolate biscuits, therefore, may have been made from Bournville wheat.

In pre-war days Bournville works possessed 126 acres of land laid out for recreational purposes and maintained by a staff of skilled gardeners, who, when war came, saw to it that every available inch of ground was put to good use. Steps taken included the recruitment of a number of girls from the factory to create Bournville's own Land Army.

The Centenary of The Chemical Society

The Chemical Society is to celebrate the centenary of its foundation in July, 1947. But for the war the celebrations would have taken place in 1941, for it was "on February 23, 1841, that twenty-five gentlemen interested in the prosecution of chemistry met together at the Society of Arts to consider whether it be expedient to form a Chemical Society." It was the first Society formed solely for the study of chemistry, and although there had been small private chemical societies before 1841 none lasted for any great length of time.

The Fellowship of the Society has grown from those twenty-five gentlemen in 1841 to over 6,000. The study of chemistry as a whole has remained its object; because of this the Society has always maintained a special place in the world of chemistry. It has not pursued the purely professional nor has it specially fostered industrial chemistry, although many great industries have been based on fundamental discoveries made by its Fellows. The professional affairs of chemists are now the province of the Royal Institute of Chemistry (founded in 1877), and industrial chemistry is the concern of the Society of Chemical Industry (founded in 1881). Both these organisations were offshoots of the Chemical Society, as were other societies specialising in subdivisions of the subject. Today some of these offshoots, having meantime grown in stature and importance, are again joined with the parent body in the Chemical Council, which consists of representatives of various chemical organisations and through which chemical industry and individuals subscribe to provide assistance in the publication of chemical research and information.

The science of chemistry has made great advances since 1841; the pure research on the growth of plants by Gilbert and Lawes at Rothamsted formed the basis of the vast present-day synthetic fertiliser industry, the importance of which in the production of food needs no emphasising in a hungry world.

With such a history and with its present-day virility the Society is clearly justified in planning to make the celebration of its centenary an important event. The importance was indeed internationally recognised in the decision taken in Rome in 1938 by the International Union of Pure and Applied Chemistry to hold its next International Congress in London at the time of the centenary of the Chemical Society. This decision is to be implemented next year, and immediately following the celebrations on July 15 to 17, 1947, the Eleventh International Congress of Pure and Applied Chemistry will also take place in London.

An international outlook has always been characteristic of the Society, and this will be reflected in the series of social and scientific events which will constitute the three days of celebrations. Many distinguished overseas delegates are to be invited. These will include the Honorary Fellows of the Society, among whom are the world's greatest chemists of today. If those invited are able to accept we shall see in London in July, 1947, perhaps the greatest international gathering of chemists that will ever have taken place.

Switchgear Installation

A series of booklets on switchgear have been published by the Brush Electrical Engineering Co., Ltd. A new one, No. B.285, has just been published and describes the change over of the switchgear of a works power station from old type to modern. The publication deals with an installation of high voltage and low voltage A.C. and D.C. switchgear in a medium-sized factory having a maximum demand of approximately 2,500 k.V.A. The booklet contains details and illustrations.

Nationalisation of Transport

COMMITTEE OF ACTION APPOINTED

The National Conference held in May for the purpose of co-ordinating traders' opposition to nationalisation of transport, attended by delegates from some 160 National Trade Organisations, representing from 750,000 to 1,000,000 individual trade undertakings, has set up a General Committee, which has elected Colonel Arthur Jerrett, M.Inst.T., as chairman, and Mr. F. D. Fitz-Gerald as secretary, and appointed a Committee of Action to direct the detailed campaign.

The wide range of trades and industries concerned, comprising a substantial section of the commercial users of all forms of inland transport, aim through joint action at convincing the Government and the public that transport plays so vital a part in ensuring maximum production and economic distribution that: (*a*) any attempt advantageously to develop the transport systems of the country by imposing State control as a substitute for private enterprise would fail, and (*b*) such a step, at best an experiment, would impede and endanger industrial development to an extent that would be detrimental to the best national interests.

Water Treatment

The development of modern boilers operating at high pressures and high rates of steaming has produced problems other than scale formation, including corrosion and caustic embrittlement, and a complete technique has been evolved for removing not only the scale-forming lime and magnesia compounds but also dissolved gases, silica, and—in exceptional cases—other impurities such as iron compounds which may give trouble when water is used in some special industrial process.

The method adopted by Sofnol, Ltd., is to prescribe for each case after an analysis of the water and a close study of the actual operating conditions. A routine of treatment is then set up using water-treatment chemicals exactly adapted to the individual requirements.

Besides all the necessary chemicals for the treatment of boiler-feed water, and of water for use in processes in food manufacture, the firm also makes the water-testing apparatus and reagents needed to assure that, once agreed, a system of treatment can be consistently maintained. For this purpose compact cabinets are supplied containing all the necessary apparatus and reagents for simple, rapid, and accurate water testing.

In cases where scale has already formed in boilers or heating systems a service is available for the safe removal of the scale by chemical means.

Technical literature is available to those interested.

Food for Road Transport Workers

Set up during the war by the Employers' and Workers' representatives on the Road Haulage Central Wages Board, the Road Transport Catering and Accommodation Joint Committee hope to improve facilities for rest and refreshment for road transport workers. For this purpose a booklet has been issued by the Committee giving advice to proprietors of establishments providing food and accommodation on the road. Apart from measures to improve existing establishments, the Committee has under consideration the provision of new hostels.

Fuel and the Future

COMING CONFERENCE IN LONDON

The Fuel Efficiency Committee of the Ministry of Fuel and Power, under the chairmanship of Dr. E. S. Grumell, C.B.E., has arranged a conference on "Fuel and the Future" to take place in London on October 8, 9, and 10.

Most sessions will take place at the Central Hall, Westminster. The opening session on the morning of Tuesday, October 8, will be addressed by the Minister of Fuel and Power and by the Minister of Health. That afternoon, and during Wednesday, October 9, the Conference will divide itself into eight separate sections. Six sections will be concerned each with one group of industries having related fuel problems. A seventh will deal with the problems of architects in connexion with new housing, and the eighth will devote itself to women's views on domestic heating.

On the morning of Thursday, October 10, there will be two general discussions on subjects of wide interest: the "Sizing and Grading of Coal" and "District Heating," while in the afternoon the Minister of Fuel and Power will take the chair at the closing session of the Conference, when the sectional chairmen will outline the proceedings of their sections, so enabling the work of the Conference to be viewed as a whole.

Those interested should apply for particulars to the Ministry of Fuel and Power, Fuel Efficiency Directorate, Queen Anne's Chambers, Tothill Street, London, S.W.1, or to any Regional Office of the Ministry of Fuel and Power.

The Institute of Fuel agreed to co-operate in the Conference and has accordingly arranged for the Melchett Lecture to be given on the evening of the first day of the Conference, October 8. The Annual Reception, Dinner, and Dance of the Institute are being arranged for the evening of October 9.

Automatic Control

With the intention of showing some of the diverse uses of automatic control, Negretti and Zambra, Ltd., have published a booklet giving brief explanations of what is effected. Of interest to the food industry is an air-operated temperature controller used to position a damper by means of a lever motor; the damper recirculates or ejects air so as to maintain the temperature in a vegetable drier. Another item is a panel for a food factory on which fourteen air-operated indicating controllers are shown, two single pen and six double pen Mersteel Temperature Recorders, and clock.

Process Timing Mechanism

For the purpose of timing batch processes on such applications as canners' retorts, etc., a timing mechanism has been built into the Short and Mason "Fulscope" recording temperature or pressure controller. The process is started by manually adjusting the instrument for the desired time period. Timing commences when the apparatus reaches the set point of the controller, regardless of how long the "coming-up" time may be. At the end of the timed period the mechanism automatically terminates the process.

The Operation of Gas Producers

The Ministry of Fuel and Power has now added to the series of fuel efficiency bulletins a manual on the operation of gas producers, designed to appeal not only to the operative but also the producer superintendent.

The main text, while dealing briefly with the general principles of gasification and the characteristics of fuels, is primarily intended to give guidance in operation to those actually doing the job. One of the points stressed in the bulletin is the importance of employing a producer superintendent and of ensuring adequate liaison between those responsible for the operation of the plant and those using the gas produced by it.

Copies of this publication are obtainable free on application to the Regional Offices of the Ministry of Fuel and Power.

Conference on Industrial Design

A two-day Conference on Design, under the joint sponsorship of the Council of Industrial Design and the Federation of British Industries, will be held in the Central Hall, Westminster, on September 26 and 27.

This is the first of a series of conferences which the Council of Industrial Design propose to hold in association with the "Britain Can Make It" Exhibition.

Papers to be delivered at the four sessions of the two-day Conference will discuss the designer's place in industry, the design of machinery, design and research, and design as an ally in exports.

Delegates will include designers and industrialists, and conference arrangements are in the hands of the Conference Secretary, Council of Industrial Design, Tilbury House, Petty France, S.W.1.

Training in Electronics

Electronics is the youngest science of the new age, but skilled technical training is an essential requirement.

Hundreds of thousands of skilled electronic workers will be needed for the development of the many applications of recent electronic inventions such as Radar, television, di-electric heating, etc. Many of the jobs will be equally suitable for men or women.

Electric and Musical Industries, Ltd. (E.M.I.), pioneers of electronic television and leaders in electronic research, have set out to remedy this situation and establish Britain as the main world centre of electronic training. For this purpose a new organisation, E.M.I. Institutes, Ltd., has been formed with the ambitious object of establishing technical training colleges throughout Britain and later throughout the Empire and other countries.

Appointment

Mr. G. A. Whipple, M.A., M.I.E.E., F.Inst.P., has been appointed managing director of Adam Hilger, Ltd., in addition to his post of managing director of E. R. Watts and Son, Ltd., in the place of Mr. Frank Twyman, F.Inst.P., F.R.S., who resigned his position on June 30 last.

The Governing Director, Mr. George Ellison, demonstrates the strength of Tufnol in the works to Alderman A. S. Giles, O.B.E., M.C., J.P., Lord Mayor of Birmingham. Tufnol is transformed from the raw materials of paper or fabric and synthetic resin solution to laminated sheets, tubes, and rods.

Exchange of Packaging Data

Data on American packaging practice will be made readily and quickly available to members of PATRA Packaging Division under an arrangement that has just been agreed to between the Printing and Allied Trades Research Association and the Packaging Institute Incorporated of New York.

The Packaging Institute does not undertake scientific research, but it is a well-organised information service. In addition to supplying the Association with copies of U.S. packaging journals for the technical library and copies of its own publications for circulation to all members of the Packaging Division, it is now available to deal with enquiries on U.S. packaging methods, developments, etc., made by British packaging firms through PATRA.

In return for this service, PATRA is to supply the Packaging Institute with copies of "Packaging Abstracts" for circulation to members of the Institute and to deal with technical enquiries submitted by the Institute on behalf of its members as they relate to British packaging.

Essences and Food Colourings

Engaged in the distillation of essences since 1851, Rayner and Co., Ltd., have a wide range of production comprising essences for bakers, chocolate makers, sweet boilers, ice cream makers, sausage and pie manufacturers, and mineral water makers. Food colourings for these purposes also form part of their production, which is under the direction of Mr. F. H. Smee, M.Sc., F.R.I.C.

Representation Changes

The Cambridge Instrument Co., Ltd., announce the following changes in their provincial district representation:

Mr. J. L. Orchard, who has been employed by the Company for twenty-seven years, latterly as resident engineer in the Manchester area, has retired from active work on reaching the age limit, and Mr. A. W. Burrell, who has for several years represented the Company in the Home Counties, has been appointed resident engineer in his place.

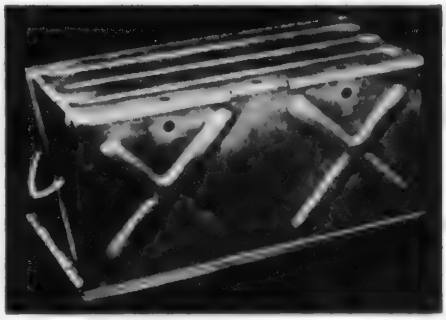
Mr. H. J. Starling, one of the Company's London representatives, has been appointed resident engineer in the newly formed Nottinghamshire district.

Natural Ventilation

The Colt system of natural ventilation is claimed to dissipate vitiated air in industrial buildings by natural circulation only. Its function is to provide increased efficiency to any existing scheme (except air conditioning) or to provide an adequate system of ventilation where previously this was inadequate or non-existent.

The system is one requiring no mechanical devices. A layout is planned by which either present convectionary currents are utilised, being reinforced by further movement at desired points, or entirely new convection is introduced by which variations in temperatures and pressures are harnessed to give steady yet variable movement of air through low-level intakes from the open atmosphere throughout the area in question, to its subsequent removal through high-level outlets in any required ratio of air changes. The equipment is made by Colt Ventilation, Ltd.

New Collapsible Container



After a year and a half of intensive experiments, Ideal Packagings, Ltd., have put on the market a collapsible, light-weight, aluminium alloy container in one unit which can be manufactured by unskilled labour. Its light weight, protectiveness against changes of temperature, and the small space occupied when collapsed are the outstanding features of this new development. The container can be made to practically any dimensions, either completely enclosed or in the form of an open crate, and can be sealed after filling by using short pieces of wire and metal seals or by using padlocks; it will stay closed even without being sealed.

The company using and owning the container can have their name and address stamped into the metal sheeting without extra cost, thereby facilitating return for reuse.

The price compares favourably with that of wooden cases considering durability and the economy of storage space.

Change of Address

The Northern Section of the Meadow Dairy Co., Ltd., announce that they have moved their premises to The Grange, Chilwell Road, Beeston, Notts. Tel.: Beeston 54821. The Buying Department will be under the control of Messrs. C. E. Gibbs and F. F. Dunbar.

I.C.I. Sales Office Move

Imperial Chemical Industries announce that their Southern Region Sales Office has moved from Mill Hill to Gloucester House, 149, Park Lane, London, W.1 (Tel.: Grosvenor 4020).

It is pointed out that, until further notice, the telephone number Mill Hill 3600 should still be used for calls to the following departments: Agricultural, Dyestuffs, Engineering Trades, Household Products, Metals, Distribution, Accounts, and Packages.

Weights and Measures

The Chief Inspector of Weights and Measures, Durham County Council, announces that Mr. J. A. White, of Sharrack Street, Southport, is the secretary of the Incorporated Society of Inspectors of Weights and Measures, and all communications should be sent to him at that address.

Aluminium Food Equipment

Aluminium is largely used for food-manufacturing equipment. Steam-jacketed aluminium kettles are used for cooking ham, corned beef, and meat loaf; also for almost all varieties of preserved fruits and vegetables. The butter, cheese, and margarine industries use aluminium equipment, and the fish-freezing industry also takes full advantage of this rust-proof, high-thermal-conductivity material. The recent 39 per cent. cut in the price of aluminium, coupled with increases in the prices of most other metals, is likely to add considerably to the number of applications of this metal in the food industry.

Almin, Ltd., specialise in light metals and are prepared to indicate the materials necessary in an item of equipment and how the part or new model will look.

Fibreboard Cases not Cartons

AN IMPORTANT DISTINCTION

Fibreboard packing cases are now definitely established as the almost universal form of outer package for a vast variety of goods for road, rail, and sea transport throughout the world, having superseded the old style wooden packing case.

They are often erroneously termed "cartons." This word, however, has been in use for many years to describe the smaller folding cardboard box used as the immediate cover for a wide variety of goods such as sugar, soap, breakfast cereals, etc. Its application to fibreboard packing cases—the stout, heavy outer containers designed to carry weights up to 1 cwt. or more—is, to say the least, confusing.

It is important in the interests of good packaging that a definite distinction should be made between light folding cartons and packing cases which are designed, both as regards material and construction, as outer containers. In the interests of all industries concerned, and of the carriers, the distinction between fibreboard packing cases and cartons or cardboard boxes should be finally and definitely established, and the word "carton" confined to its proper use—namely, that of describing the immediate container and not the outer packing case.

Fibreboard packing cases for railway risk traffic must conform to definite standards of quality and strength.

Lectures on Tea

The Empire Tea Bureau are now giving a regular series of lectures on the subject of tea, including its history, growth, manufacture, and distribution, to members of the Forces who are being rehabilitated under the Army Educational Scheme at Cadbury's headquarters in Bournville. The enthusiasm shown by members of the Forces speaks well for the future prosperity of the industry.

A film show follows the lectures, any questions are answered, and general discussion takes place.

South Wales Ports Sailing List

After an interval of nearly seven years, the G.W.R. has just issued its South Wales Ports Sailing List for the convenience of manufacturers, merchants, shippers, and others interested in imports and exports of goods to and from the United Kingdom.

The List will be issued monthly (price 6d.), and, in addition to a record of the vessels, names of owners, agents, and ports of sailing, it contains information regarding routes, labour, storage, and tidal predictions for the ports.

Hovis, Ltd.

At the forty-eighth ordinary general meeting of Hovis, Ltd., Mr. A. H. Dence, J.P. (chairman), presiding, it was shown in the chairman's statement circulated with the report and accounts that the directors were able again to recommend a dividend at the rate of 20 per cent. per annum.

Virol, Ltd.

At the forty-sixth annual general meeting of Virol, Ltd., Lord Luke, the chairman, said that the directors proposed, after paying the Preference dividend and transferring £5,000 to reserve, to recommend a dividend of 12½ per cent. on the Ordinary shares, and a bonus of 2½ per cent. These recommended appropriations were shown in the profit and loss account after deduction of income tax, leaving the balance carried forward at £45,065, an increase of £486 as compared with the balance from last year.

OBITER DICTA

- I think our affection for Spam has worn a bit thin.—*Lieut.-Col. Sir Thomas More.*
- Milk, to the non-priority consumer this winter, will be measured not in pints but in drops.—*Mr. Snadden, M.P.*
- What the sausage roll is to the Sassenach, the mealy pudding is to the Scot.—*Major Spence, M.P.*
- Is the Minister aware that haggis is the great chieftain of the pudding clan, and will she see it is done due deference?—*Mr. Gallacher, M.P.*
- You ration food for yourselves and send food to Germany to make big strong men of them again. We do not understand you.—*Belgian citizen to British visitor.*
- It has been said that man came into the world with nothing, and Hugh Dalton will see that he takes nothing out.—*Councillor C. W. Hewson, J.P., President of the National Federation.*
- If oatmeal has all the virtues claimed on its behalf in generating heat, I have solved the problem of all the sulphur and treacle which my mother made me take to cool my blood.—*Mr. McKinlay, M.P.*
- Even if one cannot get cheese, one can at a pinch put something else between bread, even if it is only a spread of margarine, but if one cannot get bread one can put nothing between it.—*Mr. G. Brown, M.P.*
- I think your food is austere and monotonous, but what a marvellous job you have done in protecting public health in the circumstances.—*Dr. C. G. King, Professor of Chemistry at Columbia University and director of the Nutrition Foundation in New York.*
- Suppose the Americans had come to London to negotiate the Loan. Not that anybody ever comes to London. We go to Moscow; we go to Potsdam; we go to Teheran; we go to Washington; we are the greatest goers that ever were.—*Mr. Beverley Baxter, M.P.*
- We have a horde of officials concerned with darkening our bread, and we have another horde to see that farmers do not send potatoes with a little wireworm in them to those dear Germans who have tried to exterminate us twice within the last twenty-five years.—*Solicitor at Goole Court.*

Crosse and Blackwell (Holdings), Ltd.

In the chairman's statement circulated with the report and accounts for the year ended December 31, 1945, at the twenty-sixth ordinary general meeting of Crosse and Blackwell (Holdings), Ltd., presided over by the chairman, Sir Frederick Eley, Bart., it was stated that so far as the profits were concerned, the result in the gross trading of the group showed a decrease of £101,000 due to cessation of Government contracts and the conversion to civilian trade, which was subject still to a considerable measure of control. However, the net profit available for stockholders showed an increase of £11,000 to £12,000, accounted for by reduction in the provision for taxation, and the directors thought fit to recommend a Victory bonus of 2½ per cent. in addition to the dividend of 5 per cent.

Smith's Potato Crisps

At the seventeenth ordinary general meeting of Smith's Potato Crisps (1929), Ltd., Sir Herbert Morgan, K.B.E., chairman, said that the net profit for the year, after provision for taxation and bringing in a recovery from excess profits tax, amounted to £95,653, and this, together with the amount brought forward from last year, left available the sum of £215,474 after deducting the interim dividend of 7½ per cent. already paid.

He formally proposed that a final dividend of 20 per cent. and a cash bonus of 5 per cent. be paid, both less income tax, and that £1,000 be transferred to staff pension fund. This left to be carried forward £162,000—or over £30,000 more than the amount brought in.

The net profit for the year, after provision for taxation, showed an increase on last year of over £6,600, but this increase was traceable to lower provision for income tax and a credit from excess profits tax recovery. Trading profits were down approximately by £18,500, which was entirely attributable to increased costs of production and the limitation which was inevitably placed on their turnover by present conditions and in particular shortage of labour.

The Rev. Robert Moore, Northern Ireland Minister of Agriculture, inspects the making of cans at the opening of the Metal Box Company's factory in Portadown.

New Factory in Portadown

CANS FOR ULSTER FOODS

As a result of negotiations between the Metal Box Co., Ltd., and the Ulster Government, a new can-making factory has recently been opened in Portadown, Northern Ireland. Speaking at a luncheon given by the directors in the factory canteen, Sir Robert Barlow, chairman and managing director of the company, said that the factory would be of considerable service to the community from the point of view of employment and as an incentive to increased production by local farmers, and he predicted a bright future for the can-making industry. This prediction was also made by the Minister of Agriculture for Northern Ireland, the Rt. Hon. the Rev. Robert Moore, who also said that the factory would provide the means whereby the surplus products of Ulster farms would be transported to the areas of greatest need.

In welcoming the company to Northern Ireland, the Rt. Hon. Brian Maginess, Minister of Labour, said that his Ministry always desired the maintenance of a high level of local employment, and he considered that the employees of this factory would be working under conditions rarely equalled in the Province.

Bacon Standards in Eire

A writer in an Irish newspaper has accused Irish bacon curers of having taken advantage of the shortage of bacon supplies and of assuming a nonchalant attitude towards quality and workmanship. He urged the creation of a board, under expert guidance, with authority to visit bacon factories throughout Eire. The proposed board should conform to standards of quality as required by purchasers. Great Britain is universally recognised as the greatest market for bacon, and yet in 1938 Eire supplied only 8 per cent. of Britain's imports against 50 per cent. from Denmark. Standards of trimming especially, the writer added, have depreciated considerably in Irish factories since 1939.

The present state of affairs was attributed to the fact that throughout the emergency the maximum amount of bacon had to be obtained from the minimum of pig.

Experiments with New Fertiliser

Thirty tons of the new fertiliser, silicophosphate, have been made by the East African Industrial Research Board for supplying agricultural authorities with material for field trials, and it is hoped that by the end of the 1946 season evidence will be available on the yield effect of silicophosphate on annual crops.

Recording this in its recently published annual report, the Board's chairman gives an account of extensive surveys carried out by Departments of the Government of Uganda leading to the opening of a rock-phosphate mine near Tororo which produced supplies of several thousand tons of a slow-acting fertiliser—a factor, incidentally, which contributed to the spectacular war-time expansion of the Kenya wheat crop. The Research Board undertook the development of a process for converting the raw rock into a more available form of fertiliser to replace superphosphates.

The soda-calcination process developed in the Research Board's laboratory, partly on the basis of a German process of the 1914-18 war, now offers the prospect of converting the Uganda phosphate into a fertiliser of perhaps even greater suitability for East African soils than superphosphates.

The name silicophosphate was recently adopted in the United Kingdom for a phosphatic fertiliser made by the calcination of a mineral phosphate with silica and soda ash. Although the process for soda-calcination treatment of the Uganda rock-phosphate developed by the Board differs in some ways from the British process, the final product is from a practical aspect closely similar.

The special character of silicophosphate rests on the fact that its phosphoric oxide content is largely insoluble in water but soluble in dilute acids. In accordance with modern agronomic thought, phosphoric oxide in this form is likely to be readily taken up by plant roots.

The Kenya Agricultural Department carried out a limited number of field trials on small grains in 1945. All indicated a considerable increase from silicophosphate over the controls and some increase over the other forms of phosphatic fertilisers.

Electric Heating for Blanching Corn on the Cob

Making frozen corn on the cob taste as though "fresh from the stalk" is the goal of radio frequency heating experiments being conducted at the University of Texas, Austin, Tex. Electrical engineering instructors are experimenting on preparation of corn for quick freezing by electric heating rather than by boiling water or live steam. "When corn is not heated sufficiently to kill all enzymes, it has a tendency to discolour and develop a cob taste," the reports show. By present methods it requires about twelve minutes to heat the corn on the cob sufficiently to kill enzymes. With the high-frequency, dielectric method corn is heated in a minute and a half.

To Prevent Foot and Mouth Disease

ARGENTINE EXPERIMENTS

What may prove to be the long-sought answer to one of the major problems of Argentina's meat industry has been the subject of discussion among Argentine research scientists during the past few weeks, following the arrival in Buenos Aires from Denmark of Dr. Sven Smidt, head of the Foot and Mouth Disease Laboratory of Copenhagen.

Dr. Smidt went to Argentina some weeks ago to study the application of his vaccine to prevent foot and mouth disease to local needs. Asked whether he was satisfied with the results of his visit, Dr. Smidt expressed cautious confidence. Experiments had been started with the use of his vaccine, he said, but circumstances in Argentina were very different from those in Denmark.

Dr. Smidt claims that his is the first and only real solution of the problem of foot and mouth disease. The process requires the isolation of the virus of the disease from a sick animal and the destruction of its harmful properties without lessening its immunising value. Other vaccines hitherto obtained, he explained, are either dangerous—that is, still active disease-carriers—or only partially successful. He claims that his vaccine is both efficacious and innocuous.—*Reuter's Trade Service.*

Egg Preservation

FLASH-HEAT TREATMENT

Professor Alexis L. Romanoff of Cornell University has made public recently a method of egg preservation which he calls "flash-heat treatment."

Oil processing and cold storage are the most common methods in commercial preservation, and water-glass solution is used in the home.

E. M. Funk of the University of Missouri suggested in 1943 the use of heat treatment in the preservation of eggs. He submerged eggs in oil or water for about ten minutes at 140° F., but the treated eggs, when beaten, did not give the necessary foam which is very important in the baking of cakes.

Professor Romanoff used in his process the same idea, but in a somewhat different way. He immersed fresh, preferably infertile, eggs into boiling water for five seconds and allowed them to cool in air at room temperature. A very thin layer of albumen, next to the shell membrane and shell, coagulated forming an additional protective film which slows down the rate of deterioration. The best results were obtained by keeping the treated eggs as close to refrigerating temperature as possible with a high relative humidity up to 80 per cent. In general, the longer eggs are to be held, the lower the temperature should be, but not below freezing point.

Professor Alexis L. Romanoff applies the flash-heat treatment to a collection of eggs in his laboratory at Cornell University.

This process of egg preservation has four distinct advantages:

1. It is clean and sanitary; some bacteria which are present on the surface of the egg may be destroyed.

2. It is simple. The use of water at boiling temperature requires neither a thermostatic control nor a stirring device, which makes the procedure easily adaptable for home as well as for commercial preservation.

3. The biological value of the egg contents is not impaired.

4. The albumen of the treated eggs retains good beating or foaming properties.

U.S. Rice Exports

United States rice exports from August, 1945, to April, 1946, inclusive, amounted to 588,000,000 lb., highest amount ever exported from the United States. During the same period last year 382,000,000 lb. were exported. More than 200,000,000 lb. of United States rice were shipped to the Far East to help alleviate serious rice shortages in the Philippine Islands, the Netherlands East Indies, and China.

The United States is exporting every possible pound of its domestic rice to help alleviate the critical world shortage of rice, the staple cereal upon which half the world's population is dependent. Essential world import requirements for rice during the April-June, 1946, quarter amounted to approximately 2,100,000 metric tons, but the amount available for export from all sources was only approximately 581,000 tons.

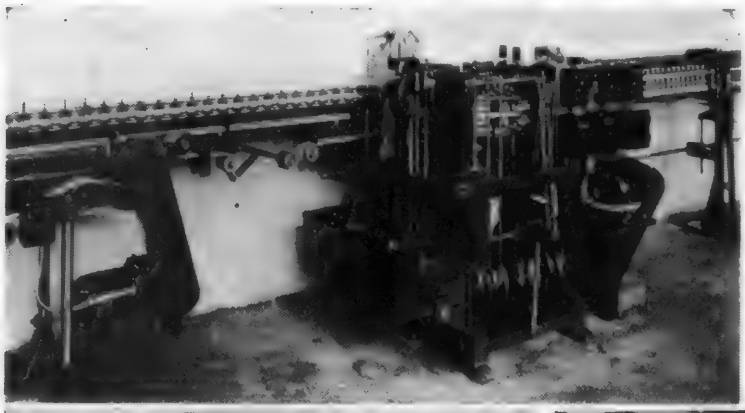
The Combined Food Board (which has now been superseded by the International Emergency Food Council) attempted to meet the Far Eastern needs by cutting out allocations of rice to the European countries entirely and scaling down requirements of the rice-importing areas in the Western Hemisphere to provide only for the subsistence of rice-eating populations.

African Margarine Factories

A new margarine factory at Durban is nearing completion and will be ready for operation shortly. Its owners, however, state that they do not know when they will receive supplies sufficient to enable them to start production.

Also under construction is a new £20,000 margarine-making plant at Salisbury, Rhodesia, which will be capable of turning out 100 tons a month. Most of the necessary machinery has arrived, and it is expected that the factory will be ready before the end of the year.—*Reuter's Trade Service.*

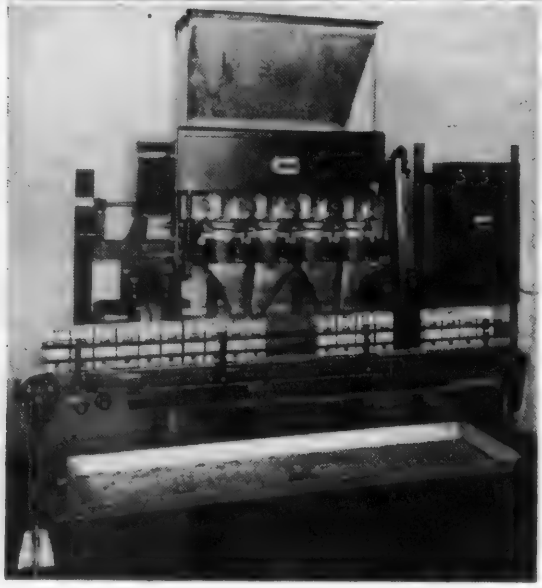
American Packaging Developments

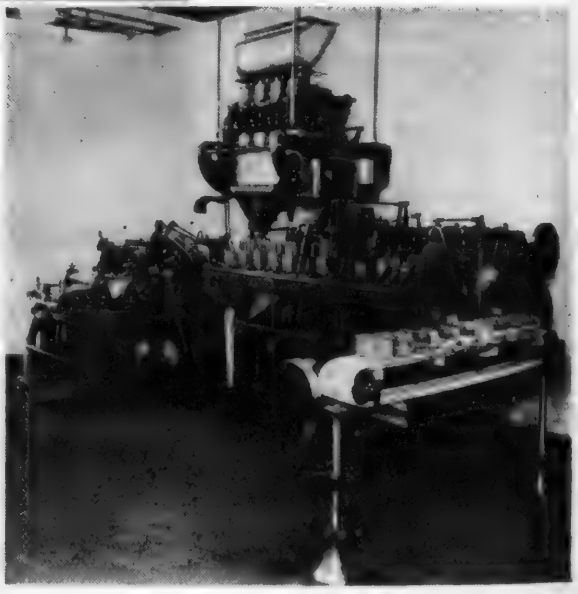


Left: Rotary top closure machine which automatically closes the top of a lined carton and glues same at speeds of approximately 70 per minute.

Bottom left: One of several types designed with vibrator feeders for handling material such as macaroni.

Bottom right: This combination automatically produces a lined bag which is filled with coffee beans and closed by tin strips and folding process.





MINISTRY NEWS

Appointment

Mr. G. N. Lawrence has been appointed Director of the Miscellaneous Food Products (including Dehydration) Division of the Ministry in succession to Mr. Frederick J. Monkhouse.

Calcium Carbonate

On the advice of the Special Diets Advisory Committee of the Medical Research Council, from August 11 the rate of addition of calcium carbonate (*Creta Praeparata*) to National flour will be increased from 7 oz. to 14 oz. per sack of 280 lb. This is to compensate for the increased phytic acid content of 90 per cent. extraction flour.

Glue, Gelatine, and Size

The Board of Trade have made the Glue, Gelatine, and Size (No. 3) Order, 1946,* which revokes and re-enacts with amendments the No. 2 Order of 1945.

The amendments are:

1. Control is re-imposed on the supply and acquisition of animal glue, gelatine, and size, and of adhesives in the preparation of which any such material has been used.
2. The quantity of animal glue, gelatine (other than edible), and size which may be used without a licence is reduced.
3. The treatment, use, and consumption of fish glue is freed from control.

Under the new Order licences will be necessary to supply, or to acquire, or to treat, use, and consume, in any quarter, quantities in excess of (*a*) 5 cwt. for edible gelatine, or (*b*) 1 ton in the aggregate for gelatine other than edible, animal glue, and size. The first quarter will run from August 1, 1946, to September 30, 1946; subsequent quarters from October 1, January 1, etc.

Applications for licences should be made to the Board of Trade, Raw Materials Department (R.M. 2C), I.C. House, Millbank, London, S.W.1.

* S.R. & O. 1946 No. 973, obtainable, price 1d., through any bookseller or newsagent or direct from H.M. Stationery Office.

Soya Flour

The Soya Flour (Control and Maximum Prices) Order, 1946, which came into force on August 11, increases the maximum price of soya flour from £33 5s 0d. to £52 5s. 0d. per ton *ex* mill to cover the increase in price of soya beans.

Imports of Boxed Fresh Fish

Until further notice the imports of boxed fresh white fish from Denmark, Norway, Holland, Sweden, and Belgium will consist only of the following varieties: brill, halibut, lemon soles, plaice, soles, and turbot.

In order to encourage a wider distribution of boxed fish, it has been decided to permit any licensed wholesale fish merchant or fish retailer in the United Kingdom to participate in these imports. No individual licences are required by traders wishing to import boxed fish, but they will have to make their own arrangements directly with foreign exporters.

The maximum weekly quantities available for import are reviewed in four-weekly periods, and are announced in the Trade Press. In order to ensure wide distribution not more than 50 per cent. of the specified imports from any country may be consigned to the London market.

The arrangements for the importation of boxed white fish from Eire remain unchanged. Any variety or quantity may be imported.

The Ministry of Food will reimburse importers in this country, other than licensed wholesalers at specified ports, with the reasonable cost of carriage from the port of entry to the importer's town. No local cartage (except from London railway termini to Billingsgate, London) or port dues will be paid. No reimbursement will be made when fish is condemned on or before arrival at the importer's premises.

The quantities available for import from each country will be as follows:

	Tons per Week.	*Tons for Period.*
Denmark	350	1,050
Norway	300	900
Holland	50	150
Sweden	50	150
Belgium	50	150

Manufacturing Meat Increases

The following increases in the manufacturing allocations became effective from the week commencing August 11, 1946:

(*a*) Group 1 (including Kosher)—increased to 60 per cent. of basis utilisation.

(*b*) Group 2 (general—including Kosher—butchers).

(i) those drawing ration meat will receive 7 per cent. of their new ration meat authorisation (which is the same as 8 per cent. on a 1s. 2d. ration).

(ii) those drawing manufacturing meat—*i.e.* bulk deliveries—will receive 5½ per cent. of their new ration meat authorisation.

(*c*) Group 3 increased to 50 per cent. of their datum expenditure.

(*d*) Group 4 (pork butchers) increased to 70 per cent. of the basic wholesale value of their authorisation.

At the same time as the increase in allocations takes place, the facilities introduced by the 1944 scheme of manufacturing meat for general butchers will be cancelled and from August 11 allocations of meat to general butchers for manufacturing purposes will normally comprise ration quality meat, and Food Offices will combine in one amount both the ration and manufacturing entitlements. The only exception to this rule will be butchers who are also Group 1 manufacturers and firms which can satisfy the Ministry that bulk delivery of manufacturing quality meat to a central factory is necessary to prevent wastage of meat or serious inefficiency. Generally speaking, no firm will qualify under this latter provision unless it has at least seven branches in the same Meat and Livestock Area.

Canned corned meat will be allocated by W.M.S.A.'s on the basis of one-eighth of the Food Office permit values notwithstanding that the latter figures in future will include the general butchers' manufacturing allocations.

Resignation and Appointment

Mr. R. Hutchinson, Divisional Food Officer for the North Midland Division, resigned on August 31, and Brigadier V. T. R. Ford, D.S.O., Deputy Divisional Food Officer, South-Western Division, will fill the vacancy.

Christmas Puddings

The minimum oil and fat content of Christmas puddings has been reduced from 10 to 9 per cent. This change is intended to enable manufacturers to increase their production of puddings, which is severely restricted as a result of the shortage of oils and fats.

Quick Freezing of Fish

A number of people who contemplate setting up plant for quick freezing of fish have asked the Minister of Food for wholesale licences to deal in fish and for allocations of fish.

The Minister attaches great importance to quick freezing as a means of improving the marketing of fish, and, so as not to retard the development of the process, he has informed the applicants that licences and allocations will be granted when the plants are ready to work. Allocations will be commensurate with the capacity of the plant. Similar applications by firms of repute will also be given this favourable consideration.

Wheat (Control and Prices) (Great Britain) Order

An Order amending the Wheat (Control and Prices) (Great Britain) Order, 1945, came into force on August 1, 1946, and gives effect to the increased prices for wheat recently announced, including the provision of an increase of 1s. 6d. per cwt. for millable wheat threshed and delivered in August and September, 1946.

A grower may retain for feeding to his own livestock wheat of the 1946 harvest of his own growing provided the total acreage of wheat grown by him in the United Kingdom does not exceed two acres. Effect is thereby given to the decision made and announced in the Press in April, 1945, intended to assist the smaller farmer in feeding his stock. A farmer to whom this concession applies, but who is prepared to sell the wheat, will, however, be encouraged to do so, and will be able to claim the wheat acreage payment provided he supports his claim with a certificate from an approved buyer that the whole of the wheat from such acreage has, in fact, been sold.

The Order also defines the two types of non-returnable Hessian sacks supplied to growers by the Ministry of Agriculture for which a fixed charge of 10d. each is obligatory on resale.

Feeding Stuffs Prices

An Order which came into force on August 1, 1946, prescribes revised prices for imported wheat, oats, and rye, and also for processed wheat, oats, and rye in keeping with the adjusted prices for home-grown grain.

The alterations of the oat prices take into account the decision to apply the July price to oats of the 1945 crop delivered during August, 1946. A similar concession made last year with regard to old-crop wheat for delivery during August and September is not being repeated.

Apart from the price alterations referred to above, the 1946 Order is a consolidating Order, and it revokes and substantially re-enacts the Feeding Stuffs (Maximum Prices) Order, 1943, as amended.

Oats (Control and Prices) (Great Britain) Order

An Order further amending the Oats (Control and Prices) (Great Britain) Order, 1944, came into force on August 1, 1946.

New minimum and maximum prices for oats are prescribed for the 1946-1947 season. The scale is slightly higher than last year to cover the recent wage increase. The arrangement whereby old-crop oats sold in August obtain the higher July price is continued. The special provision permitting damp combine-harvested oats to be sold at a price not more than 2s. per cwt. below the maximum on certification by a Local Oats Panel is discontinued.

The Order makes it illegal, except under licence, for a seed oat merchant who is also an oatmeal miller to mill oats which he has bought for seed.

A new definition of the non-returnable Hessian sacks supplied to growers by the Ministry of Agriculture, for which a fixed charge of 10d. each is obligatory on resale, covers both types now in circulation.

Rye (Control and Prices) (Great Britain) Order

By an Order amending the Rye (Control and Prices) (Great Britain) Order, 1945, the Minister of Food has prescribed new prices for rye as from August 1 in accordance with the decision already announced to increase prices following the recent wage increase.

The Order prohibits the sale of millable rye to, and the purchase or use of millable rye by, distillers. It also contains a new definition, covering the two types now in circulation, of the non-returnable Hessian sacks supplied to growers by the Ministry of Agriculture, for which a fixed charge of 10d. each is obligatory on resale.

Dredge Corn (Control and Prices) (Great Britain) Order

By an Order amending the Dredge Corn (Control and Prices) (Great Britain) Order, 1945, the Minister of Food has prescribed new maximum and minimum prices for millable dredge corn (other than barley dredge corn) and new maximum prices for barley dredge corn as from August 1. The other maximum and minimum prices in the 1945 Order remain unchanged.

A new definition of the non-returnable Hessian sacks supplied to growers by the Ministry of Agriculture, for which a fixed charge of 10d. each is obligatory on resale, covers both types now in circulation.

Barley (Control and Prices) (Great Britain) Order, 1946

The Barley (Control and Prices) (Great Britain) Order, 1946, which came into force on August 1, revokes the 1945 Barley Order, but repeats its principal provisions.

The Order prescribes increased maximum prices for barley for human consumption and reduced minimum prices for millable and potentially millable barley. A new definition of the non-returnable Hessian sacks supplied to growers by the Ministry of Agriculture, for which a fixed charge of 10d. each is obligatory on resale, covers both types now in circulation.

Information and Advice

Ice Cream

B.1200. *We have the following materials available:*

Liquid glucose 44° Bé
Skimmed milk
Saccharin
Maize starch powder
Manioc flour
Vanilla
Egg Powder

We should be obliged for some recipes for the manufacture of ice cream, utilising some or all of these ingredients. (Belgium.)

The above ingredients permit of the manufacture of only very poor products, containing no fat and about 22 per cent. solids. Using the ingredients available the following formulae are suggested:

1. Glucose	... ...	12 lb.
Egg powder	... ...	2 lb.
Maize starch powder	...	5 lb.
Saccharin	... ...	94 grains
Skimmed milk	... ...	82 lb. (8 gallons.)
Vanilla	... ...	to taste
	Total	100 lb.

2. As above, but substituting 5 lb. of manioc flour for the maize starch flour.

In processing, the maize starch flour and the manioc flour will require boiling (or heating to at least 200° F. in a double-jacketed boiler) in order to cook these ingredients.

The egg powder should be pasteurised at 150° F. for 30 minutes, the process being started as soon as possible after the powder has been moistened. When pasteurisation has been completed, the mix should be cooled down to 40° F. as quickly as possible. These precautions are desirable to prevent bacterial contamination.

It is presumed that saccharin is available in tablet form, each tablet containing a specified number of grains of saccharin (possibly two grains). This product is 500 times as sweet as sugar and 14 grains of saccharin have the sweetening equivalent to 1 lb. of sugar.

The formulae are designed to give a total sweetness equal to 12 per cent. of sugar. If a sweeter mix is required, add more glucose (to increase the total solids in the mix); if it is too sweet, use less saccharin.

If the manufacturer does not possess an emulsifier, the addition of butter or margarine would be difficult even if an emulsifying agent such as glyceryl monostearate were used. If available, a few pounds of synthetic cream and up to 3 lb. of skimmed milk powder could, with advantage, be added to the mix.

Information Supplied

B.1107. *Literature on sausage rusks.* (Kenya Colony.)

B.1108. *Manufacturers of chain conveyors and air-conditioning equipment and also information regarding storing of sausages.* (Warwicks.)

B.1109. *Firms supplying extrusion machines and conveyors to carry light loads.* (Essex.)

B.1113. *Names and addresses of suppliers of semolina in the West of England or Wales.* (London.)

B.1114. *Suppliers of machinery for (1) the desiccated coconut industry, (2) canning fish; also details of manufacturers of essential oil plant.* (London.)

B.1115. *The manufacture of potato crisps.* (London.)

B.1116. *Manufacturers of mixing machine with stainless steel pan.* (Belgium.)

B.1117. *Firms manufacturing Kraut cutters and presses.* (Surrey.)

B.1119. *Method of manufacturing liquid coffee extract and suppliers of appropriate machinery.* (Lancs.)

B.1121. *Literature on the subject of drying and canning pulses.* (Leics.)

B.1124. *Manufacturers of refractometers.* (Bucks.)

B.1127. *Method, equipment, and plant for roasting, salting, and packeting peanuts.* (Eire.)

B.1128. *Details of process for packing vegetables in brine and names and addresses of manufacturers of necessary machinery.* (Eire.)

B.1129. *Method for brining onions and cucumbers.* (S. Africa.)

B.1135. *Names and addresses of manufacturers of paper pulp mills.* (S. Africa.)

B.1136. *Information concerning a good floor for use in a butter and cheese packing factory.* (Bucks.)

B.1138. *Firms manufacturing stone kneading rollers.* (Scotland.)

B.1140. *References to articles dealing with the brining of vegetables.* (Derby.)

B.1143. *Names and addresses of firms manufacturing hand-worked machinery for the production of macaroni and vermicelli.* (Tanganyika.)

B.1146. *Information regarding invert sugar and glucose, and also a suitable base for colour flavour compound.* (Warwicks.)

B.1148. *Makers of machinery for the manufacture of marzipan.* (Mexico.)

B.1149. *Names and addresses of manufacturers of canning machinery in the North of England.* (Lancs.)

B.1150. *Suppliers of coding ink for greasy tin plate cans.* (Kenya.)

B.1156. *Equipment and plant for the packing of fish in glass containers.* (Scotland.)

B.1157. *Names and addresses of suppliers of choppers and mincers for handling chilled hog livers.* (London.)

Information Required

B.1234. *Source of supply of dark and light "Armenian" bole.* (London.)

B.1254. *Names and addresses of British manufacturers of steamers, shredders, paring knives, cracking irons, and anvils used in the processing of desiccated shredded coconut, interested in export business.* (Canada.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

577,221. WEERTH, H. K. DE: Machines for cooking, dehydrating, and/or cooling foodstuffs and other industrial products.

577,227. HALL, W. A.: Hand appliance for extracting baked loaves from baking tins or pans.

577,361. SMITH, E. C. BATE-, PARTRIDGE, S. M., SHEED, A. H., and WESTALL, R. G.: Preservation of meat.

577,399. KNOWLES, F. W.: Cooking grill.

577,483. NEWMAN, J. E., and KENNEDY, D. S.: Apparatus for drying grasses and the like.

577,506. WINGFOOT CORPORATION: Paper bags.

577,516. CLELAND, J. G.: Collapsible boxes, cartons or the like.

577,533. BYRNE, J. F., and POWLING, P. S.: Extraction and preparation of agar.

577,544. STEVENS, A. H. (Gibson Electric Refrigerator Engineering Co.): Absorption refrigeration systems, and control apparatus therefor.

577,571. ARMSTRONG, J. J. V. (Continental Can Co., Inc.): Apparatus for the sealing of containers.

577,618. SVENSKA TURBINFABRIKS AKTIEBOLAGET LJUNGSTROM: Ice producer.

Abstracts of Recent Specifications

Improvements in Can Openers

This invention relates to openers for cans or boxes which are made as one-piece articles of comparatively small size. It has particular reference to a can opener of the kind comprising a body made as a one-piece steel stamping having one edge gapped and formed in the gap with a pointed lip engageable under the beaded rim of a can in fulcrum fashion to enable the point of an integral blade-like flange rigidly extending substantially at right angles from the body to puncture the can end-wall and the cutting edge of the flange to cut said end-wall as the can-opener is stepped with a rocking action around the can perimeter.

The object of the present invention is to provide an improved construction of can opener of the kind referred to.

A can opener made as a one-piece steel stamping comprises a body of substantially rectangular shape, an integral substantially right angular flat flange extending out sidewardly from one long edge of the body commencing at one short edge thereof, with the inner terminal end of the flange fashioned to form a cutting edge and curved or inclined away from the termination of the junction between the body and the flange toward an outer pointed portion, and a recess or gap, commencing substantially where the flange ends, that is, approximately half-way along said long edge of the body, and terminating at a lip pointing in the opposite direction to and arranged substantially level with or slightly below the flange point, the recess or gap accommodating the beaded rim of a can and its lip engaging with a stepped action under said bead to serve as a fulcrum about which the can opener rocks as the flange cutting edge cuts through the can end-wall after being punctured by the flange point, and the remaining half portion of said long edge between the pointed lip of the recess or gap and the opposite short end of the body being tapered in width.

575,565. *Anthony Joseph Marek.*

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

BARSH.—634,713. Soup, soup extracts, soup powder, vegetable soup preparations, and soup tablets. **Amarant, Ltd.,** Northgate House, 20-24, Moorgate, London, E.C.2; Manufacturers and Merchants.

ORCHARD PRIDE.—635,838. Honey, sago, rice, and tapioca. **S. and W. Berisford, Ltd.,** 20 and 22, Withy Grove, Manchester; Merchants.

OTBIX.—636,027. Oat biscuits (other than biscuits for animals). **The Caledonian Milling Co. (Aberdeen), Ltd.,** Caledonian Mills, Palmerston Road, Aberdeen; Millers and Grain Produce Merchants.

FORBIDDEN.—636,342. Jams, jellies (for food); tinned, dried, and preserved fruit; cheese, butter, eggs, dried herbs (for food), preserved meat, meat extract, milk, milk preparations (for food), pectin, pickles, fruit and vegetable preserves, soups, soup powders, soup extracts, vegetable soup preparations, dried and preserved vegetables, dead poultry. **John Carr Doughty, Ltd.,** 31, Cank Street, Leicester; Manufacturers.

MAGIC.—636,720. Baking powder. **Standard Brands, Ltd.** (a Corporation organised under the laws of the Dominion of Canada), 1010, St. Catherine Street West, Montreal, Quebec, Canada; Manufacturers. Address for service is c/o Marks and Clerk, 57/8, Lincoln's Inn Fields, London, W.C.2.

MOLTESERS. — 636,955. Confectionery (not medicated). **Mars Confections, Ltd.,** Broad Street House, Old Broad Street, London, E.C.2; Manufacturers and Merchants.

GOLF.—637,279. Boiled sweets and toffees, none being medicated. **Ernest Marshall,** trading as **Copper Kettle Preserves,** Chester Walk, Cheltenham Spa, Gloucestershire; Manufacturer.

SYMPHONY.—637,282. Jams. **William Hodkinson and Sons, Ltd.,** 74, Stuart Street, Manchester, 11, Lancs; Wholesale Grocers and Provision Merchants.

New Companies

H. Brundrit and Co., Limited. (407611.) To carry on the business of manufacturers of and dealers in steak and other puddings, pies, etc. Nom. cap.: £3,000 in £1 shares. Permt. dirs.: P. L. Ashworth, Anice H. Ashworth, and R. P. Ashworth, all of Beryldene, Mains Lane, Little Singleton, nr. Blackpool.

Ovenhand, Limited. (407634.) 6, Great Winchester Street, E.C.2. To carry on business of manufacturers of and dealers in ovens, cooking appliances, etc. Nom. cap.: £1,000 in £1 shares. Dirs: D. Davies, 74, Prince's Square, W.2; Margaret Y. Rees, 804, Chelsea Cloisters, S.W.3.

Stamford Ice Cream Co., Limited. (407657.) 17, High Street, Stamford, Lincs. Nom. cap.: £3,000 in £1 shares. Dirs.: J. V. Regis, 55, Aberdeen Park, Highbury, N.1; J. P. Regis, 45, Conduit Road, Stamford; G. Scala, 51, Drift Road, Stamford.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.